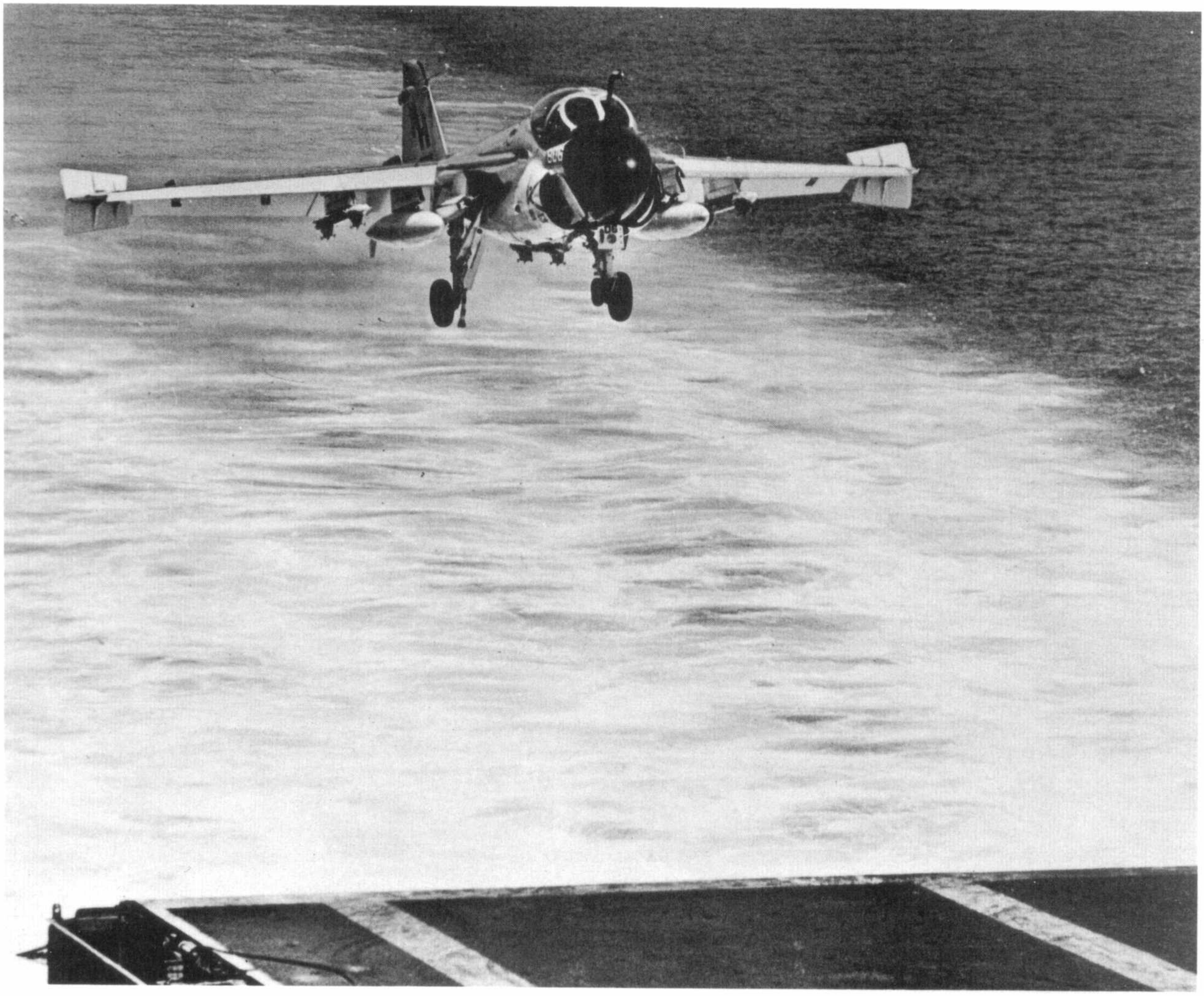
PROFILE

Aircraft

252

Grumman A-6A Intruder & EA-6 Prowler

40p/$2.00



Coming home to roost. Ordnance expended A-6A of VA-85 Black Falcons, *CVW-11 (NH) in the groove and ready for recovery aboard USS* Kitty Hawk *during Vietnam operations in 1966. Wing tip speed brakes are deployed and hook is down.*
(Photo: Grumman 66741)

Grumman A-6A/E Intruder; EA-6A; EA-6B Prowler

by Kurt H. Miska

'The Grumman A-6 family comprises the most modern, combat-ready, all-weather attack aircraft available on the free world inventory.'

Consider the proven facts. Armed with 15,000 pounds of ordnance, attack versions of the A-6 Intruder can be launched in pitch-black conditions from the flight deck of a carrier, can be navigated hundreds of miles through bad weather to seek out and attack a non-visual target, and can return to the 'moving airfield' of the aircraft carrier without recourse to any external reference. To date, only one other aircraft type—the land-based General Dynamics F-111 of the US Air Force—has superior capability. But the F-111's combat career is brief enough against the A-6's nearly eight years to make any comparative assessment unfair.

The A-6 Family

Despite a fine combat record under every conceivable condition and the unique capabilities of the A-6 and its variants, in 12 years the total production of new airframes has barely exceeded 500 units. At the time of writing, the only services to operate the A-6 are the US Navy and the

US Marine Corps. Interest by the US Air Force has been token only and no foreign sales have been announced.

Navy A-6 inventory comprises the A-6A, A-6B, A-6C, KA-6D, A-6E and EA-6B Prowler and the Marines fly the A-6A, KA-6D and EA-6A. Both services operate the TC-4C flying classroom for A-6 crew training.[1]

The A-6 is equally suitable for operations either from carriers of the *Midway*-class and bigger, or from land bases.

Numerous Variants Prosper

The Grumman A-6 Intruder family, with exception of the EA-6B Prowler, is a series of two-place, all-weather attack aircraft powered by two turbojets. Utilitarian, unflattering lines have earned it a number of nicknames, of which only 'Mighty Tadpole' seems to have gained currency among knowing Fleet personnel.

Currently, six variants of the A-6 are in operation, as follows:

A-6A (488 airframes). This is the basic aircraft, which first flew in April 1960, and is currently powered by two, non-afterburning Pratt & Whitney J52-P-8 engines rated at 9,300 pounds thrust each. Empty weight is 26,066 lb., ordnance capacity is nearly 18,000 lb. and range is transoceanic. Maximum speed is 540 knots (623 miles per hour) and cruise is 400 kt (460 mph).

A-6B (19 aircraft; no new airframes). All aircraft (a/c.) are conversions of A-6As and are electronically configured as missile carriers in three different sub-variants offering from limited- to full-strike capability.

A-6C (12 a/c.; no new airframes). All are conversions of A-6As under the US Navy's TRIM (Trails, Roads, Interdiction, Multisensor) Programme. The A-6C is configured with electro-optical sensors to aid in carrying out strikes against non-radar significant targets.

KA-6D (51 a/c.; no new airframes). Feasibility of an A-6 air-to-air refuelling tanker was first shown in April 1966. But it was not until the summer of 1970 that the Navy began to procure the KA-6D tanker in quantity. All are rebuilt A-6As prior to c/n 250 (BuNo. 152941).

A-6E (36 a/c. through Fiscal Year 1972). With completion of the A-6A contract in FY 1969, the Navy ordered an advanced all-weather A-6 using multimode radar, solid state avionics and numerous reliability improvements. Externally the A-6E is the same as the A-6A.

A-6(—). This is a projected version of the A-6 which will incorporate electro-optical sensors in the A-6E. The programme is known as Target Recognition Attack Multisensor (TRAM).

EA-6A (27 aircraft). Concurrent with initial production of the A-6A, the Marine Corps ordered this electronic countermeasure version of the A-6. This model retains partial attack capability.

EA-6B Prowler (47 a/c. through FY 1973). This four-seat variant of the A-6 is an electronic warfare aircraft used by the Navy. The first three test aircraft were A-6A conversions, followed by five prototypes and then series production. This model carries no armament.

With initial smaller rudder, the first Intruder, BuNo. 147864 in landing configuration reveals tilting tailpipes to good advantage. This and next three A-6As (BuNos. 147865–7) had hydraulically tilting tail pipes arranged to swivel down 23° to improve short field and carrier capability by reducing take-off and landing speed by about 11 mph. However, no real improvement was noted and the system was deactivated early in the programme.
(Photo: Grumman 60654)

Development—Long and Thorough

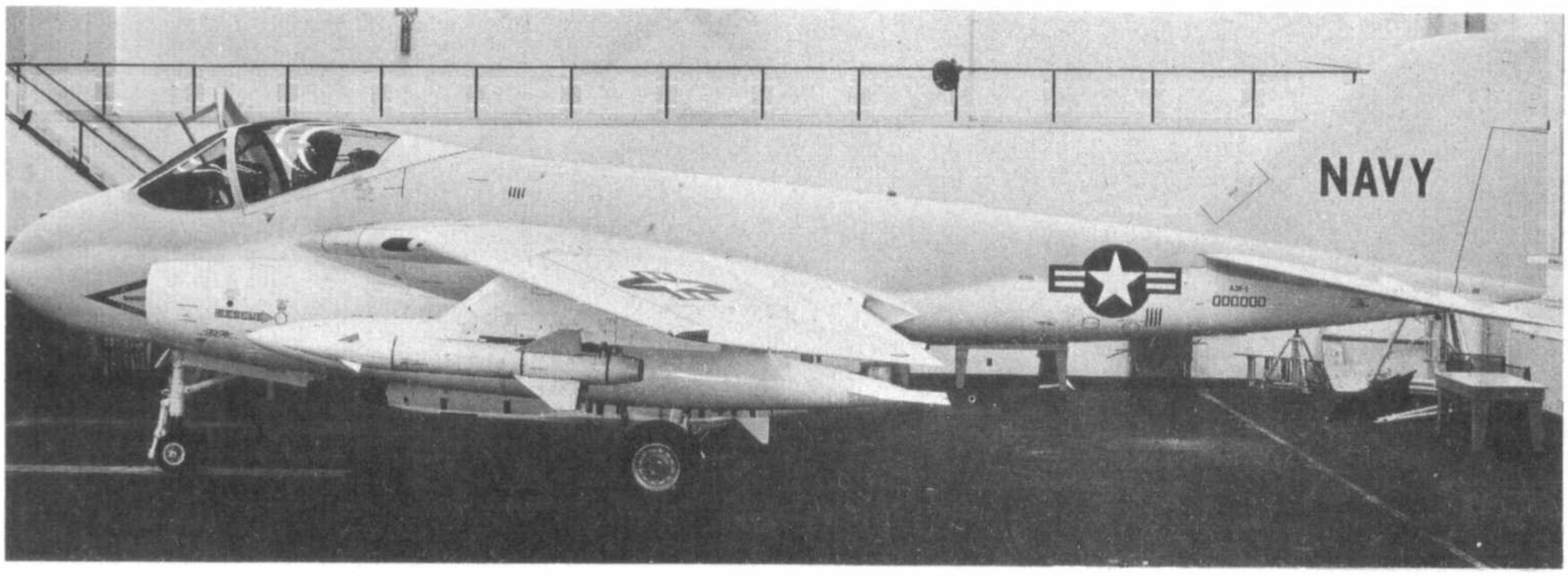
Genesis of the all-weather attack aircraft goes back to the Korean War but the necessary technology was lacking at that time. However, progress was made in radar, navigation systems and cockpit displays and, in 1956, the Navy was able to issue requests for proposals for a new all-weather attack aircraft. It was to fill the void between the Douglas A-1 Skyraider[2] and A-4 Skyhawk[3] light attack and the Douglas A-3 Skywarrior and North American A-5 Vigilante heavy attack aircraft.

The Navy wanted the new aircraft to be able to fly long distances at low altitude by night, find and attack moving and stationary targets and

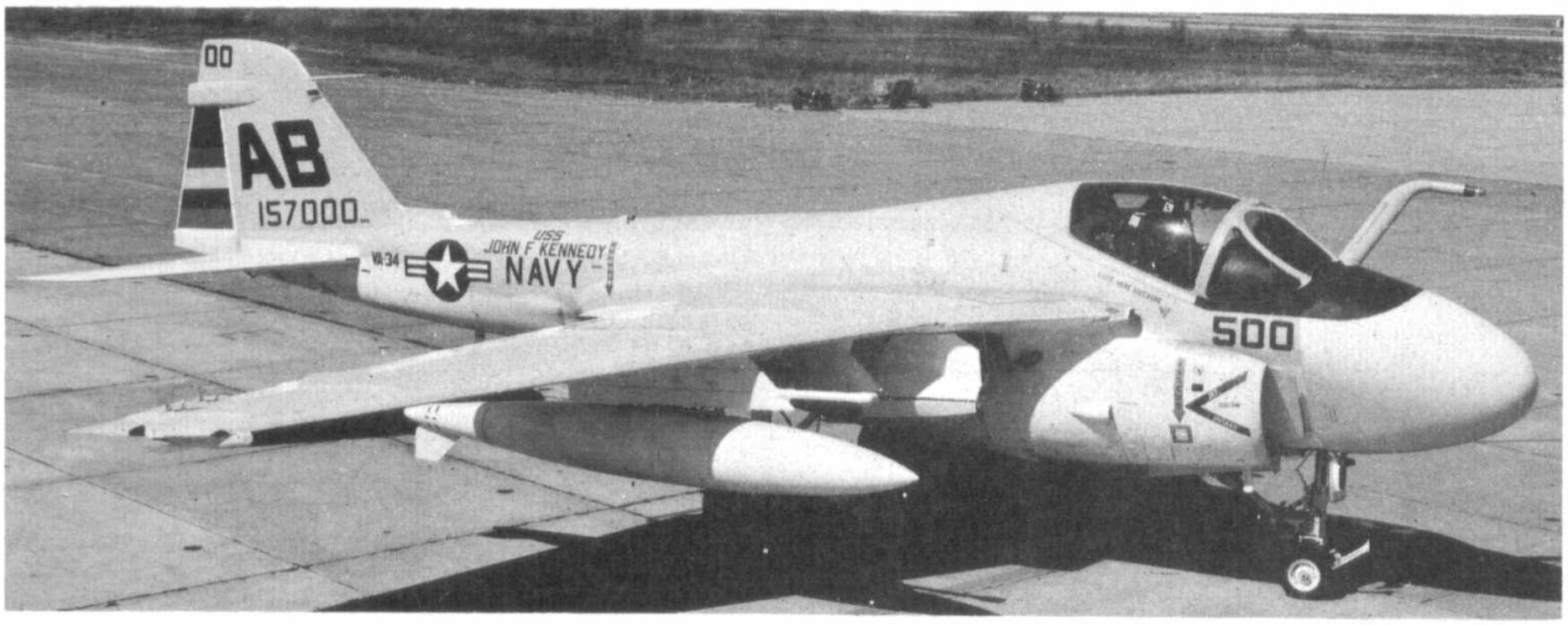
[1] For consistency and uniformity, all variant references to early Intruders conform to the Unified Nomenclature System, adopted in November 1962, before which the A-6A was A2F-1 and the EA-6A was A2F-1H.

Similarly, although the TC-4C (which is Grumman G-159 Gulfstream I-based) pilot and bombardier/navigator trainer is an integral part of the A-6 community, comprehensive coverage is outside the scope of this *Profile*.—Author

[2] See *Aircraft Profile No. 60*; [3] see *Profile No. 102*.



Mock-up of A-6 at Grumman. Basic lines of the aircraft have changed little over the years. Refuelling boom and fuselage speed brakes are yet to be incorporated.
(Photo: Grumman G-59663)



A-6A of VA-34's commanding officer, Captain Gene Sizemore, in April 1970 at NASA Oceana, Va. Colours on rudder are (top to bottom): black, red, yellow, blue, orange and white. AB is code for CVW-1.
(Photo: US Navy)

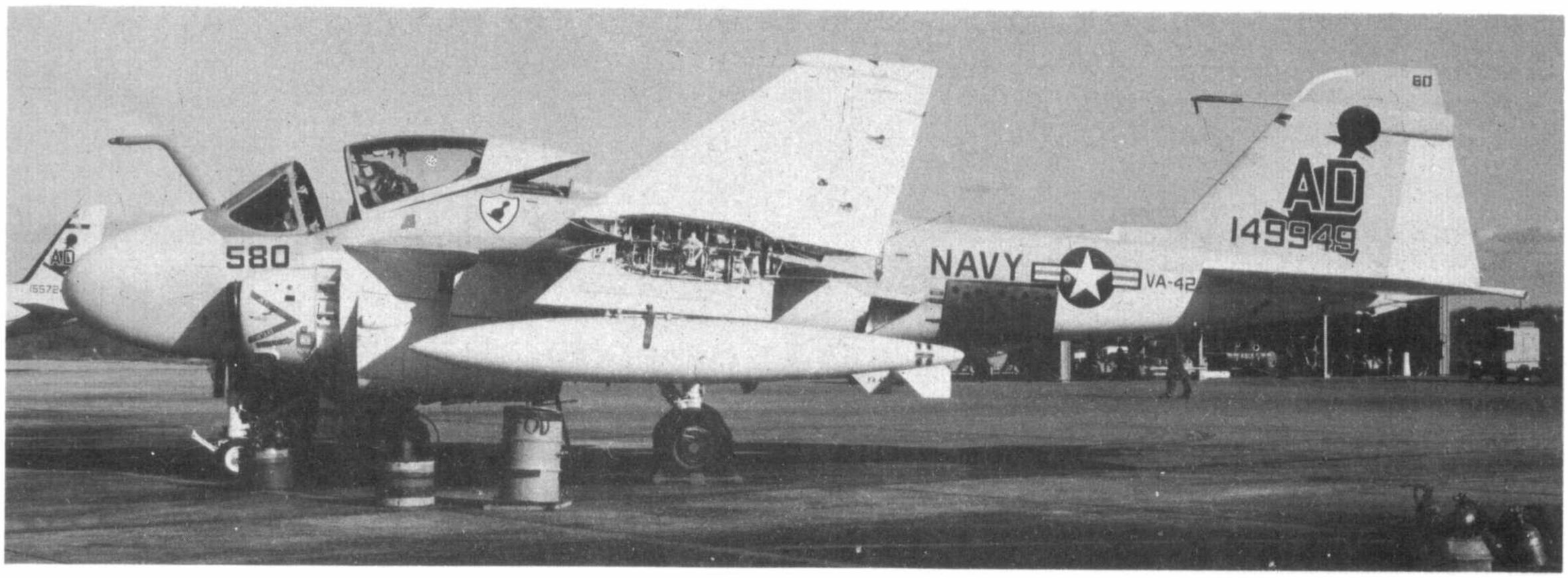
return to its land or carrier base without aid of external navigational references. Nuclear capability against land targets was also part of the request. Indeed a tall order.

Response came from Martin, Douglas, Vought and Boeing with two designs each and Bell, Grumman, Lockheed and North American with one design each. Noteworthy entries were Boeing's response with one subsonic (turboprop) and one supersonic design and Bell's vertical-take-off-and-landing (VTOL) proposal. On the very last day of 1957, Grumman Design 128 was selected the winner. Design 128 was subsequently USN-designated A2F-1.

Subsequent to Grumman's victory in the design competition, significant milestones were recorded in May 1958 with formal signing of the development contract and 11 months later with award of a $101-million incentive fee development and production contract. Construction of the first A-6A (BuNo. 147864, the USN serial no.) proceeded and the aircraft made its first flight out of Grumman's Calverton Field on April 19 1960 with Bill Smyth at the controls. Four days prior the company had announced that the name Intruder had been selected after a company-wide contest, which drew 4,000 names in 1,000 entries.

Other milestones on the road to Fleet deployment were the first flight of a fully configured A-6A in November 1960 and the Navy Preliminary Evaluation (NPE) in September 1961.

A-6B of VA-42 (AD) at NAS Oceana, Va. in December 1969. Rear fuselage brake is still operative. Drop tanks are 300-gal. units. Code AD is assigned directly to VA-42 Green Pawns *since decommissioning of RCVW-4 in 1970. This coding also retained by other ex-RCVW-4 units. These are VA-174 (A-7 Corsairs) and VF-101 (F-4 Phantoms).*
(Photo: Author)



On December 15 1961 the range of the A-6A was impressively demonstrated for the first time when class desk officer Lieutenant Commander C. P. (Bud) Ekas, USN, flew BuNo. 148617 (c/n 7) from Naval Air Station North Island, California, to Calverton, NY. The non-stop 2,583-mile flight took 4 hours 30 minutes and was accomplished on internal fuel only.

Recommendations made during the September 1961 NPE had been incorporated and another NPE was held in December 1962. By November 1962, airframe BIS (Board of Inspection and Survey) had also begun at Naval Air Test Center (NATC) Patuxent River, Maryland. By then Fleet introduction was less than two months away. Thus, on February 7 1963, Vice-Admiral Frank O'Beirne, Commander US Forces Atlantic, took formal delivery of two A-6As for Attack Squadron Forty-Two (VA-42) 'Green Pawns'. The squadron then began training of aircrews for future A-6A squadrons.

A-6—General Description

All models of the Intruder share a common basic geometry, though the EA-6B has an extended fuselage.

The basic A-6 design is a mid-wing configuration with 25° sweepback at the quarter chord. Wing span is 53 feet 0 inches (25 ft. 4 in., with wings folded); area is 528.9 square feet. Wing thickness range is 9 to 6% from root to tip and the aerofoil is a modified NACA 64A009 section at station 33, modified 64A005.9 at the tips and 64A008.4 at the fold joint. The wing has a negative dihedral of one degree and is mounted with a zero degree angle of incidence.

The continuously variable wing flaps are 30% chord surfaces of the semi-Fowler slotted type and these are set to 30° for take-off and 40° for landing. Flap area is 52 sq. ft. per wing. The wing leading-edge slats are also continuously variable from zero to 27.5°. A third set of wing control surfaces are 'flaperons' (flap + aileron) for lateral control and these travel up to a maximum of 51°. To decrease landing roll during short field operations, the flaperons pop up to 42°, provided both throttles are retarded and the aircraft has set on its landing gear. Finally, there are wing tip speed brakes (BuNo. 149940 and subsequent) which open to an included angle of 120° and have an area of 24.24 sq. ft.

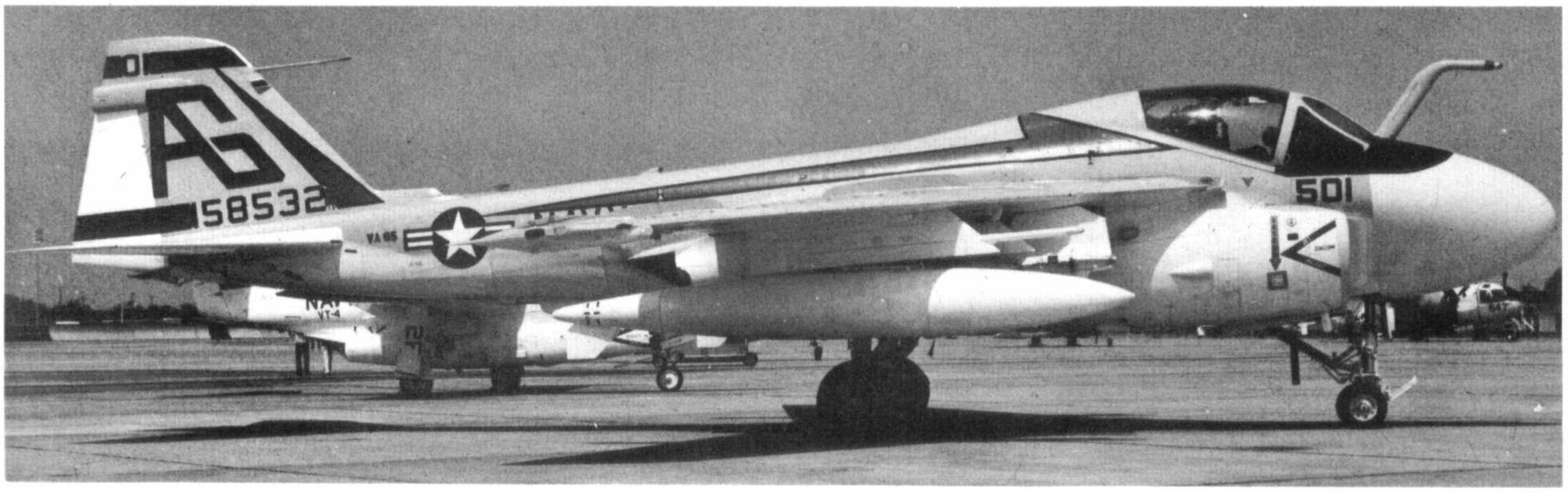
The horizontal tail comprises two one-piece slab surfaces of 117 sq. ft. swept 30° at the quarter chord. They are mounted at 0° dihedral and their deflection ranges from +1.5° leading-edge 'up' to −24° leading-edge 'down' in landing and spin recovery configuration.

The vertical tail or fin and rudder has an area of 79.25 sq. ft., of which 16.32 sq. ft. is rudder. Rudder deflections are 4° left and right when the aircraft is clean and 35° left and right with flaps down or for spin recovery. Sweep at the quarter chord is 28°.

The original fuselage speed brakes have now been deactivated on A-6As prior to c/n 310

Camouflage trial. Between March and May 1966, VA-65 and VA-85 evaluated three different camouflage schemes, but did not adopt any. Here is BuNo. 151822 of VA-65 Tigers *at NAS Atsugi, Japan. Flaps and slats are deployed and single centre-line fuel store is in use.*
(Photo: I. Yatsuhashi)

Brand new. A-6E of VA-65 Tigers, *CVW-7 (AG), at NAS Albany, Ga. in July 1972. White nose radome became standard with all A-6s subsequent to BuNo. 155628. Markings are vivid orange.*
(Photo: Ken Buchanan)



(BuNo. 154170) and were deleted during production on those subsequent to shop 310. Since they do not have wing tip brakes, EA-6As retain the fuselage brakes.

Maximum length of the A-6 is 54 feet 9 inches, and maximum height is 16 ft. 2 in. Height, while folding wings, 21 ft. 11 in.

Airframe, powerplants and avionics

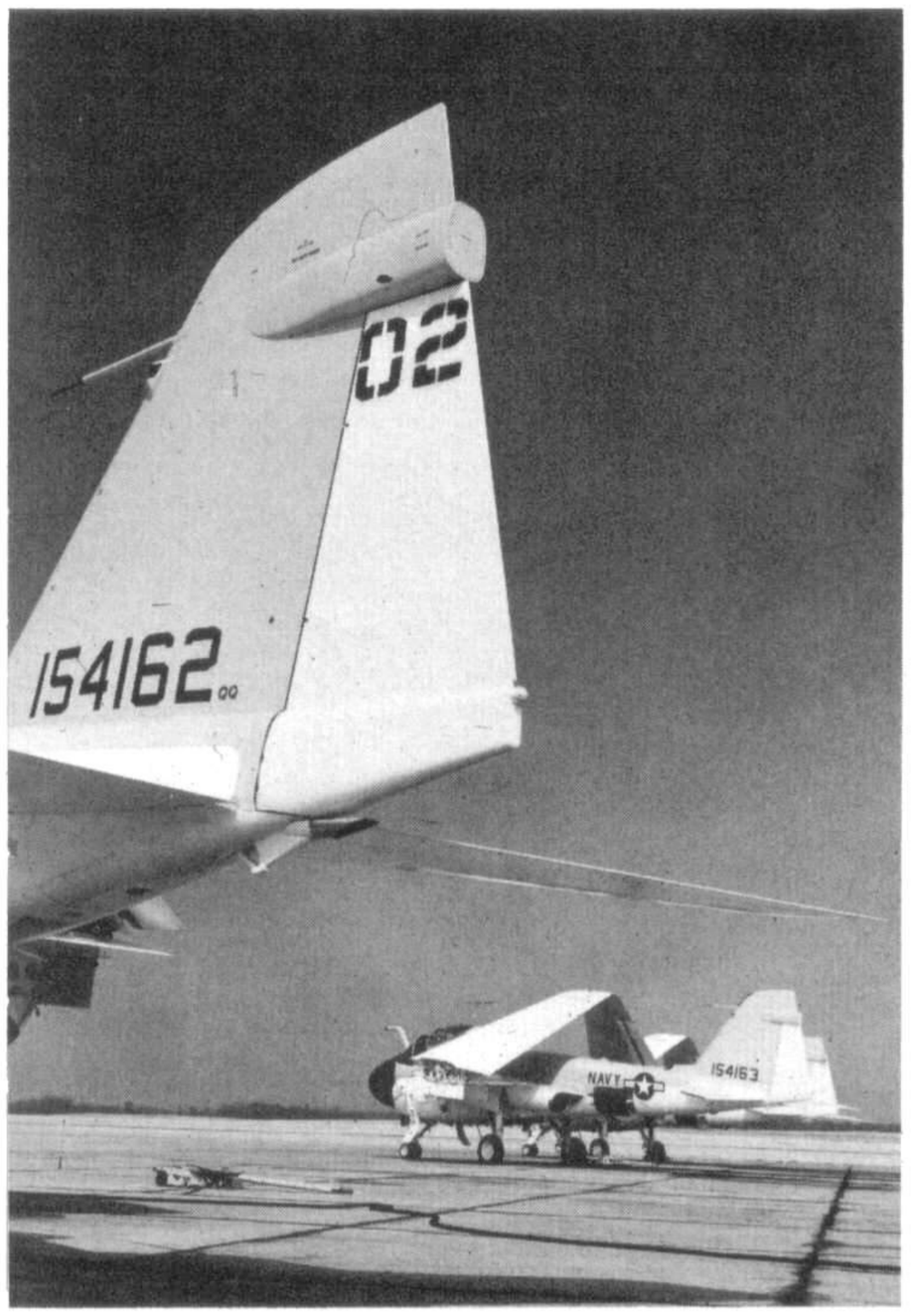
The Intruder is essentially an aluminium aircraft powered by conventional turbojet engines and employing avionics that reflect the 'state of the art' of the late 1950s. There have been hundreds of engineering changes to the airframe. Similarly, engine changes have taken place; while on the A-6E, a major avionics innovation has been introduced. From an operating systems standpoint, the A-6 is essentially a hydraulic aircraft.

The wing is divided into five major subassemblies: centre-section and left and right or port and starboard inner and outer panels. The centre-section has a continuous box beam passing through the fuselage and both inner panels are spliced to this section. All five subassemblies contain integral fuel tanks.

The inner and outer panels use multi-beam construction and are covered by machined skins with integral ribs. Each wing fold joint uses four steel hinges and hydraulically-driven locking pins.

The aluminium fuselage is of semi-monocoque construction except for the lower half, where a deep structural keel beam of steel and titanium is used between the engines and non-structural doors that enclose the engine compartment. Aluminium honeycomb panels are used for structural covers over the fuselage fuel cells.

The horizontal stabilizer or tailplane is of multi-beam construction, with machined aluminium



A wide-angle view of the flight line of A-6As at Grumman's Calverton facility on eastern Long Island.
(Photo: Fred Annette)

Up, up and away! A-6A of VA-85 Black Falcons, *CVW-11, (NH) leaves from angle deck of USS* Kitty Hawk *in South China Sea. Ordnance is on outer and centre pylons. 1966.*
(Photo: Grumman 66740)

Maintenance. A-6A of VA-75 Sunday Punchers, *CVW-7 (AG), with all systems down. Avionics 'birdcage' open below fuselage, starboard engine is out and ram air turbine on top of inside starboard wing is deployed. NAS Oceana 1964.*
(Photo: Grumman 64820)

skins and an aluminium honeycomb trailing-edge. The stabilizers are retained on a steel tube that is mounted in bearings in the fuselage.

Rudder, flaps and slats have conventional leading-edges and aluminium honeycomb trailing-edges. The fin is also multi-beam construction with aluminium honeycomb skin and a glass fibre tip cap.

Design limit load factor within the flight design envelope is +6.5 g at 32,526 lb.; and, for asymmetrical flight manœuvres, the limit is +5.2 g. Strength is sufficient to withstand 20.3 feet per second sink speed at design landing gross weight of 33,637 lb.

The A-6's landing gear is a conventional tricycle arrangement with addition of the catapult tow link to the nose strut. The main gear uses 36 × 11 wheels and tyres and also features an anti-skid system. The nose gear uses dual 20 × 5.5 wheels and tyres.

The A-6 has two completely independent 3,000 pounds per square inch hydraulic systems. One is the flight system using one 14 US gallons per minute pump on each engine to power the primary flight controls. The other is the combined system which also uses a 14-gal./min. pump on each engine; and it powers the primary flight controls and general utility items. Loss of flight hydraulic pressure limits the use of the combined system pressure to the longitudinal, lateral and directional control surfaces and the speed brakes.

Engines and Fuel System

In 1972, P&WA—Pratt & Whitney Aircraft Division of the United Aircraft Corporation—ran an advertisement for the 11,200 pounds thrust J52-P-408 turbojet, two of which are being installed in the newest and heaviest Navy A-6, the EA-6B Prowler. The bold headline message read: 'How can a hotshot of 6 years ago have 12 even better years ahead?'. The body copy went on to answer the question by stating that since 1959, the J52 has grown 50% in thrust. As the J52-P-408, the unit offers 23% boost in the Intruder/Prowler's power—without any significant change in engine size, shape or weight. P&WA's advertisement ended on the confident note that 'the J52 can grow still more—enough to power the A-6 series well into the 1980s.'

In fact, A-6s built have been powered by variants of the J52. Intruder production prior to c/n 136 (BuNo. 152583) had the 152-P-6 units installed; thereafter the J52-P-8 turbojets of 9,350 pounds thrust (700 pounds greater output over the P-6) was employed. Although the EA-6B, with its heavier all-up weight, uses the P-408 (BuNo. 158544 and subsequent Prowlers), a 1963 proposal to install the turbofan P&WA TF30 was dropped when it became obvious that the change would involve extensive airframe modifications.

Two self-sealing fuel cells and one fuselage fuel bladder cell (9,016 lb.), three integral wing cells (6,923 lb.) and assorted equipment comprise the A-6 fuel system. All store stations can carry 300 US gallon capacity external tanks (8,160 lb.); additionally, a 300-gal. refuelling store (2,040 lb.) may be carried on the centreline store station. This brings the maximum fuel for an A-6A or A-6E tanker mission to 26,139 pounds weight or 3,844 US gallons of JP-5 fuel. (Capacities and capabilities of the KA-6D tanker will be found under its description later in this *Profile*).

NAS Whidbey Island in 1964. VAH-123 (NJ) still had responsibility for A-6A replacement air crew training. This task was taken over by VA-128 Golden Intruders *of RCVW-12 (NJ). RCVW-12 was decommissioned in 1970 and code NJ assigned directly to VA-128 and other former RCVW-12 units—VA-122 (A-7s) and VF-121 (F-4s).*
(Photo: Unknown)

Flight line of A-6As at Grumman's Calverton facility on eastern Long Island.
(Photo: Grumman)

Swordsmen of VA-145. CVW-9 (NG) aboard USS Enterprise in December 1968 during pause in arming. Double-zero in side number 500 denotes this A-6A is assigned to squadron skipper. (Photo: Bob Nandall)

A-6A of VMA(AW)-224. Code WK; USMC assigns code letters directly to squadron. This A-6A is armed with small practice bombs on outer pylons. Antenna for AN/ALQ-100 countermeasure set projects from outer pylon. Rudder stripes (top to bottom) are: red, yellow, red, yellow. (Photo: D. Kasulka)

DIANE

Without the Digital Integrated Attack and Navigation Equipment, or DIANE, the A-6A's attack capability would be limited at best. However, using DIANE and sub-systems the crew can fly against preselected targets, and targets of opportunity, with a variety of ordnance loads, over any kind of terrain, and under varying tactical conditions, without the crew needing to look outside the cockpit from launch to recovery.

Automatic navigation, requiring only selection of operating mode, and manual insertion of pertinent navigation data and flight control may be varied from non-automatic to fully-automatic 'hands off' mode. But, in all modes, the pilot is provided with an instant display of the immediate tactical situation by means of the analog 'highway in the sky' display.

The attack function is fully implemented by DIANE for acquiring and tracking the target, solving the ballistic equations and generating weapons release signals. This frees the pilot from non-essentials and he may devote his full attention to immediate tactical decisions and simply monitoring the flight.

The complexity of the DIANE system can be appreciated by a brief description of the many sub-systems and components that constitute its make-up.

AN/ASQ-61 ballistics computer is a digital computer which supplies flight pattern data, navigation cruise commands and data to aid in selection, fuzing and delivery of weapons.

AN/ASW-16 automatic flight control system (AFCS) is the aircraft's three-axis autopilot.

CP-729A, -863/A or -864/A air data computer supplies altitude, static pressure, Mach number and airspeed data to the AFCS, vertical display, ballistics computer and conventional flight instruments and displays.

AN/ASN-31 inertial navigation system (INS) is an automatic aid to navigation which is independent of outside references. The INS provides information on aircraft heading, attitude, and horizontal and vertical velocities. The data is derived from accelerometers mounted along three axis on a gyro-stabilized platform.

AN/APQ-92 search radar provides the pilot with capabilities for navigation to and from the target area, search and detection of stationary and moving targets, all-weather low-level attack, automatic and rate-aided manual tracking.

AN/APQ-112 track radar tracks moving and prominent stationary targets and maps terrain ahead of the aircraft.

AN/AVA-1 vertical display is a TV-like display to aid the pilot and give him terrain clearance and elevation scan.

AN/APN-141 radar altimeter is a low altitude (5,000 ft.) electronic altimeter with precise readouts at very low altitudes, such as are encountered during carrier approach.

AN/APN-153 radar navigation set (Doppler) supplies ground speed and drift angles to the ballistics computer.

AN/ASQ-57 integrated electronic control and **AN/AIC-14** intercommunications system provides communications systems, navigation and identification (IFF) functions. Navigation functions take the form of TACAN and ADF.

The main bulkhead at the nose radome

hinge-line constitutes the reference mounting surface for the INS gyroscope and search and track radar antennae. Other avionic equipment is mounted on the bulkhead to simplify maintenance. The aft equipment compartment houses units of the Doppler radar, radar recorder, air data computer and integrated electronic control. The Doppler radar antenna and other equipment is mounted on the extensible equipment platform, sometimes known as the 'birdcage'. This platform is hinged to the fuselage so that it can be lowered for equipment accessibility. Lowered, it provides a ladder to enter the aft equipment compartment.

There were many anxious moments during the initial deployment of the A-6A, involving concern as to whether or not it would ever make the grade. Many A-6As flew with 'partial' systems, that is, not everything was working. At times, a staggering 60 mmh/fh (maintenance man-hours per flight-hour) was once the rule but that has improved markedly by now.[1] Maintenance time is still high for the avionic systems, but when it all works there is no question in respect of the Intruder's success in all-weather attack.

Major Model Changes

Since the first A-6A rolled-out, six variants have been built and deployed to Fleet units. Several other models have been proposed but not built.

A-6B—The first A-6B proposal and contract was for an A-6A 'stripped' of its all-weather avionics and used for visual attack but this contract was cancelled.

The A-6B now in operation exists in three different (modified) configurations: Mod. '0'; Mod. '1'; and PAT/ARM (Passive Angle Tracking). Each version uses the USAF-developed General Dynamics AGM-78 Standard ARM (anti-radiation missile) in SAM (Surface-to-Air Missile) suppression. All three configurations represent a different approach to the same mission. Little additional information is available because of military security requirements. Externally this model is the same as the A-6A.

A-6C TRIM—In early 1968 a modified A-6A (BuNo. 147867) with large wing-mounted pods took to the air for the first flight of simulated electro-optical sensors. It was the beginning of a programme called TRIM (Trails, Roads, Interdiction Multisensor). TRIM was an outgrowth of a Southeast Asia requirement for an aircraft with increased daylight capability.

The A-6C was the Navy's answer and the Martin/General Dynamics B-57G[2] was USAF's answer. The A-6C supplements A-6A all-weather capability with forward looking infra-red (FLIR) and low light level television (LLL-TV) systems. Because these sensors are mounted in a turret underneath the fuselage that particular store station is no longer available. A third element in TRIM is the direction finder which notes presence of targets by means of a video display. All of these are 'real time' systems. The FLIR and LLL-TV are regarded as complementary to one another. Much of this programme is also veiled in secrecy but it is known that the A-6C has been successfully deployed to Southeast Asia.

KA-6D Tanker—Using the A-6A's generous payload capacity to carry extra fuel was demonstrated by Grumman in April and May 1966. An A-6A (BuNo. 149937; shop 23) was converted to tanker configuration for demonstration purposes. By May 27 1966 all tests were completed; an A-6A and a McDonnell Douglas F-4 Phantom[1] had been refuelled by the demonstration tanker.

However, it was not until the latter part of 1969 that contract negotiations were finished to proceed with a production tanker, then designated KA-6D. It was an austerity programme. No new airframes or static test articles were specified; aircraft in the pre-200 (BuNo. 152891) (c/n) series were to be selected for conversion.

Initially four A-6As were flown to Calverton and conversion began at once. On April 16 1970, Grumman's Chuck Sewell completed the production tanker's (BuNo. 151582) first flight. After the first four KA-6Ds were completed, the programme shifted to Grumman's Stuart, Florida, facility.

Conversion involves removal of the avionics 'birdcage' in the aft fuselage and associated all-weather cockpit displays not needed for the tanker mission. In place of the 'birdcage' is a hose-and-reel assembly which transfers fuel at rates up to 350 gallons per minute. As in the A-6A, the fuel supply is contained in wing and and fuselage tanks, augmented by five 300-gal. external fuel tanks. This gives the KA-6D a total of 3,844 gal. of fuel, of which just about 3,000 gal. are transferable. A McDonnell Douglas D-704 'Buddy Mission' refuelling store, in place of the centreline 300-gal. tank, can be used as a back-up.

The KA-6D has retained daylight visual attack capability, but plans to equip it with four 20-mm. cannon in the nose have been dropped through lack of funding. This refuelling version of the A-6 Intruder is a replacement for the McDonnell Douglas KA-3B Skywarrior tanker. In the course of company evaluation some drogue spit-out problems arose, but once cured, the KA-6D demonstrated its ease of refuelling all in-flight refuellable Navy aircraft.

A-6E—On February 27 1970, yet another milestone in the A-6 programme came and went with little fanfare. On that day the prototype A-6E (BuNo. 155673; A-6A airframe 404) completed its first flight with Grumman pilot Joe Burke and B/N (Bombardier/Navigator) Jim Johnson at the controls.

Key to colour side views

1 A-6A Intruder *of the US Navy's Attack Squadron Fifty-Two or VA-52 (calling themselves the 'Knight Riders'). Tail code letters NL identify Carrier Air Wing or CVW-15. Period, 1968.*

2 A-6C *of VA-165, the 'Boomers' (on the tail and sandwiching NG for CVW-9 is the unit's stylized boomerang). Ventral centreline turret contains FLIR and LLL-TV equipments. Period, 1970.*

3 KA-6D *in-flight tanker refueller of VA-115 (the 'Chargers') bearing CVW-5's code letters NF. Period, 1972.*

4 A-6E *of VA-65, the 'Tigers' with code letters AG denoting CVW-7. Period, 1972.*

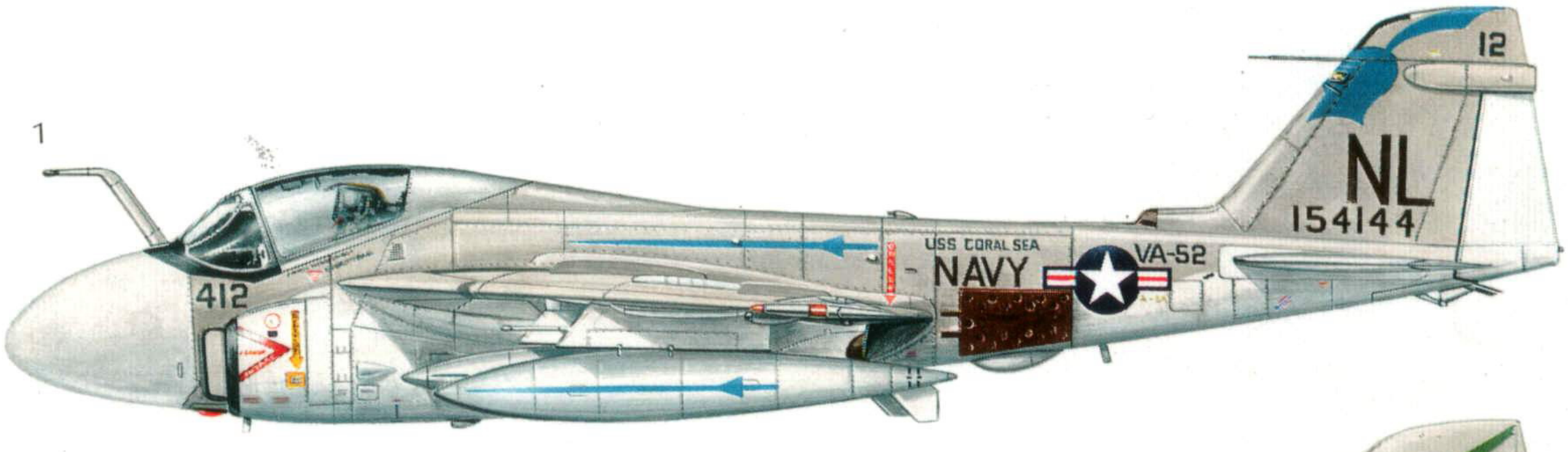
5 EA-6B Prowler *of VAQ-131, a Tactical Electronics Warfare Squadron. Period, 1972.*

[1] For the USN A-7A Corsair II, the manufacturer's contract guarantee was set at 11.5 mmh/fh—see *Aircraft Profile No. 239 LTV (Vought): A-7A/E Corsair II.*—Editor

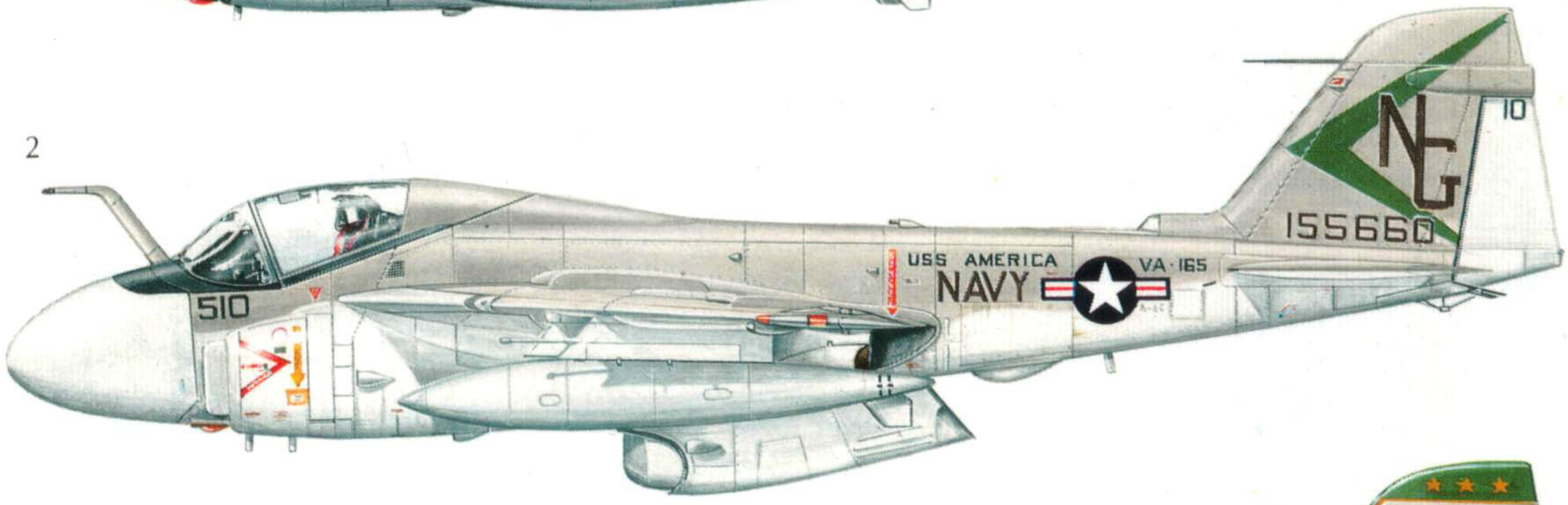
[2] *Profile No. 247: Martin B-57 A/G & RB-57F.*

[1] *Profile No. 208.*

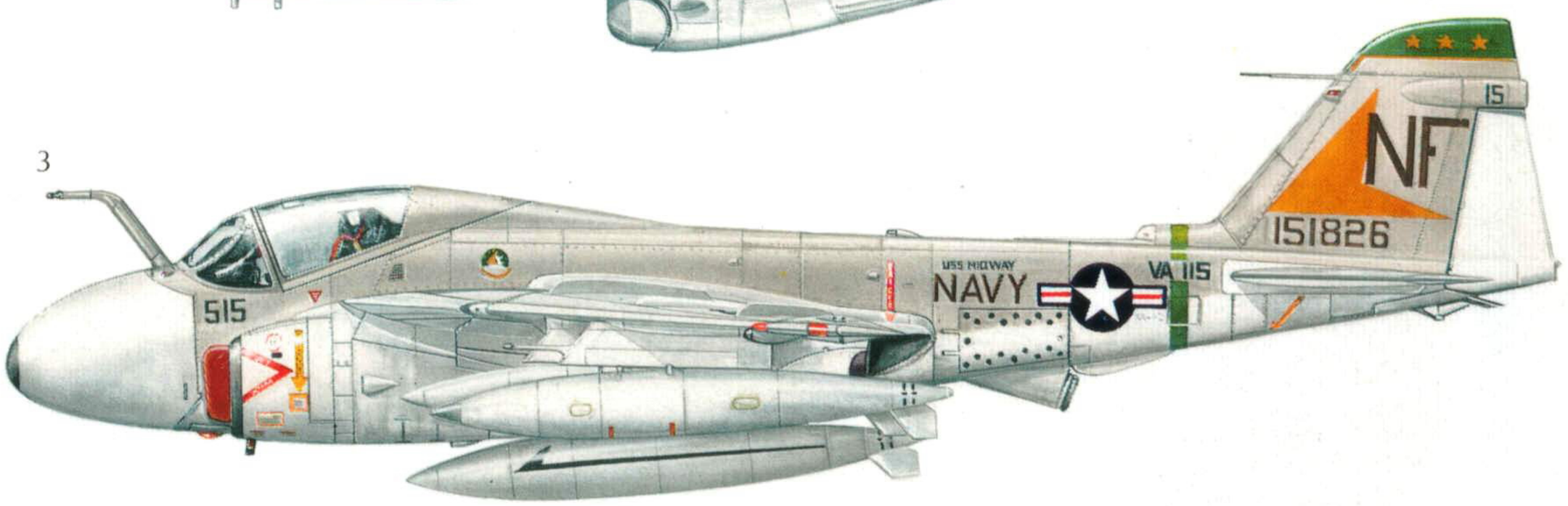
1



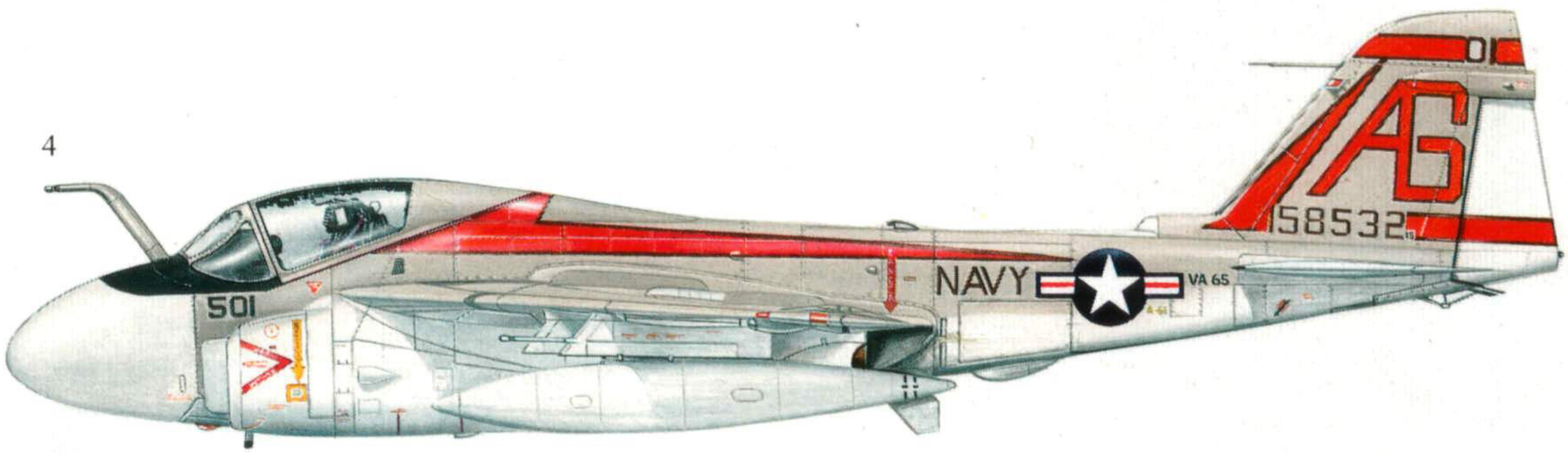
2



3

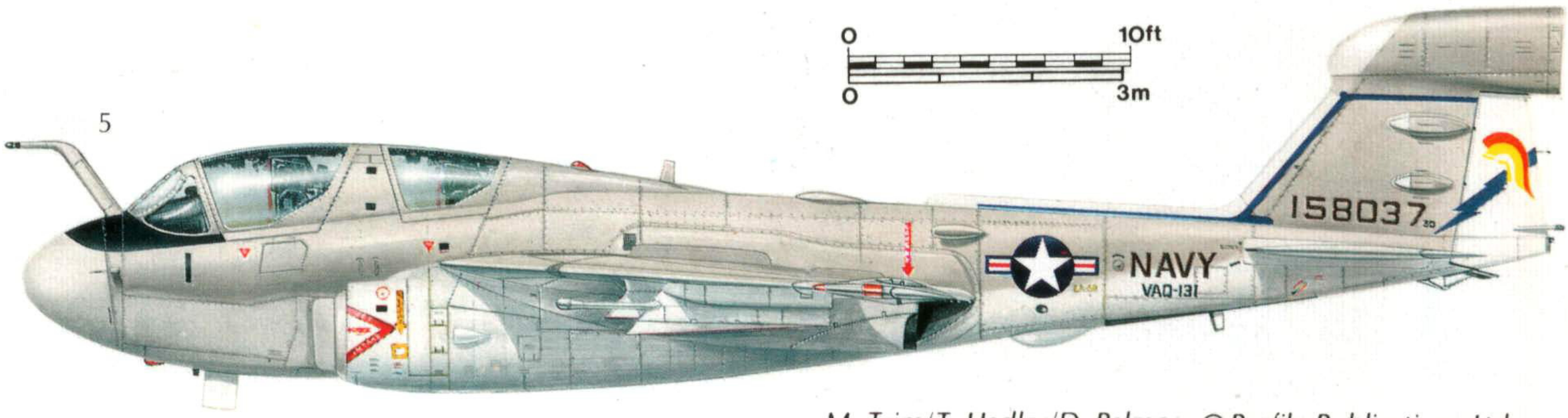


4

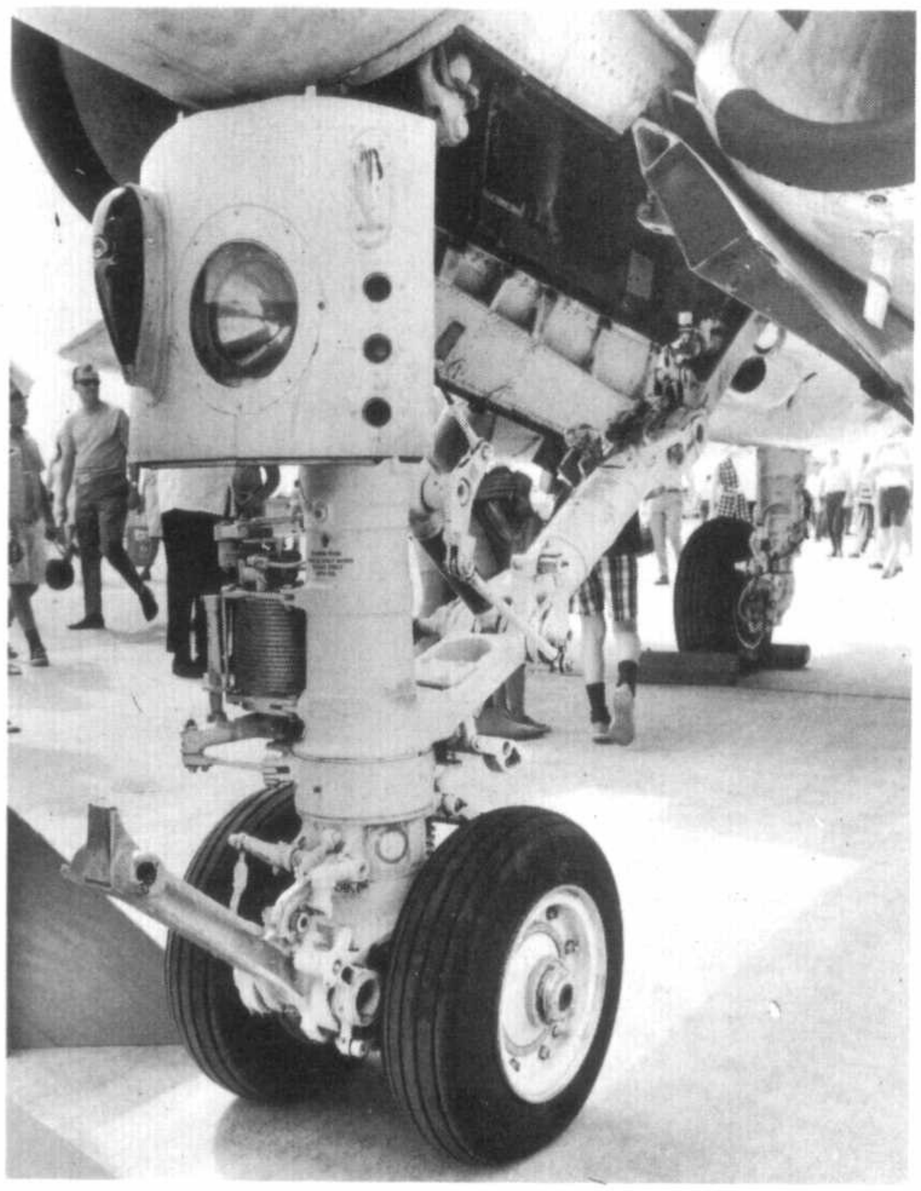


0 10ft
0 3m

5



M. Trim/T. Hadler/D. Palmer ©Profile Publications Ltd

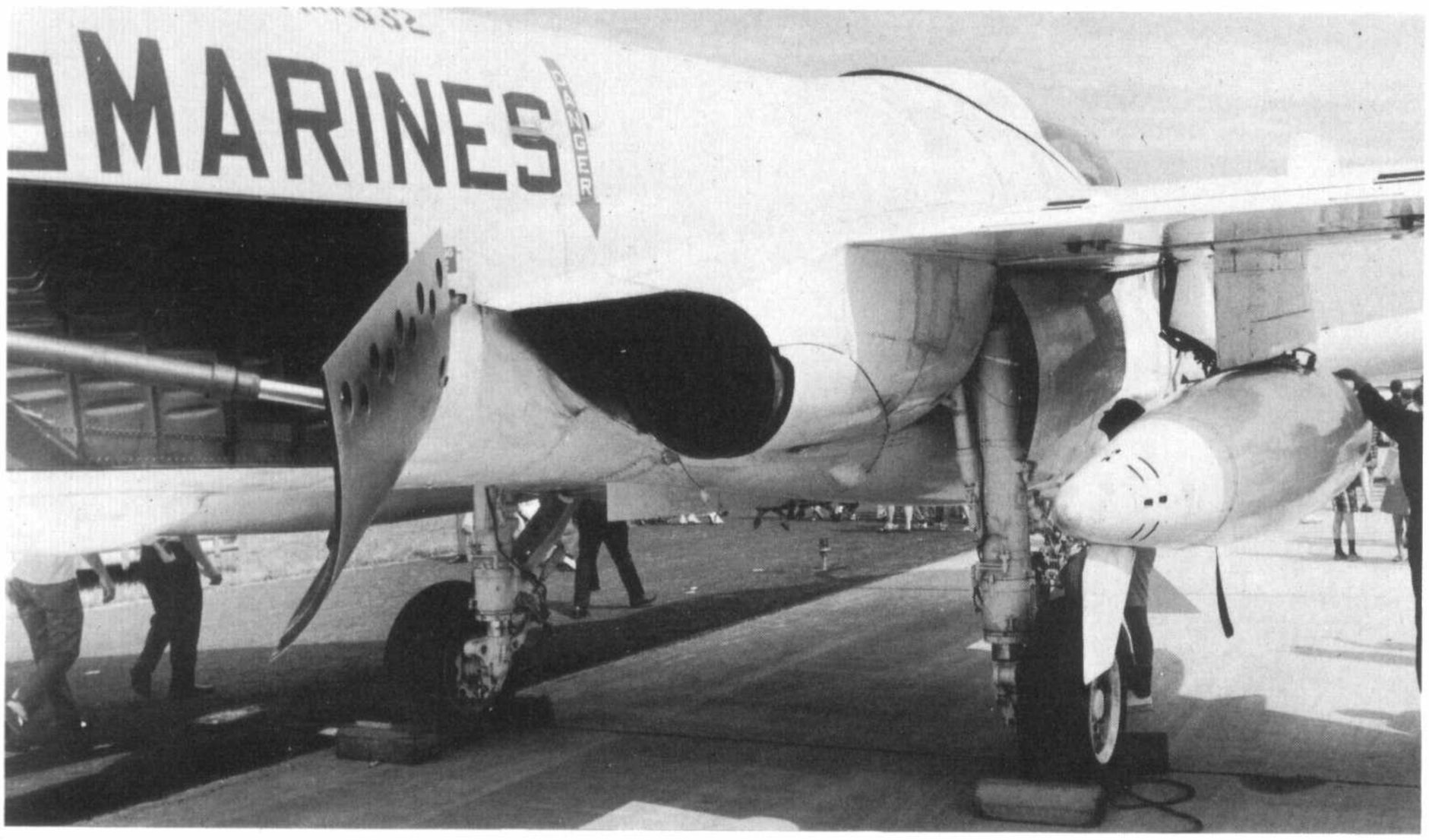


Massive nose landing gear. Tow link on front of nose strut must withstand substantial forces when A-6 weighing 60,000 lb. is launched. Drag brace is equally massive. Steering actuator is in middle and lights on gear door are (left to right) anti-collision, taxi and angle of attack.
(Photo: Author)

The A-6E is a true second generation Intruder. All changes are avionic and the external appearance remains the same as the A-6A.

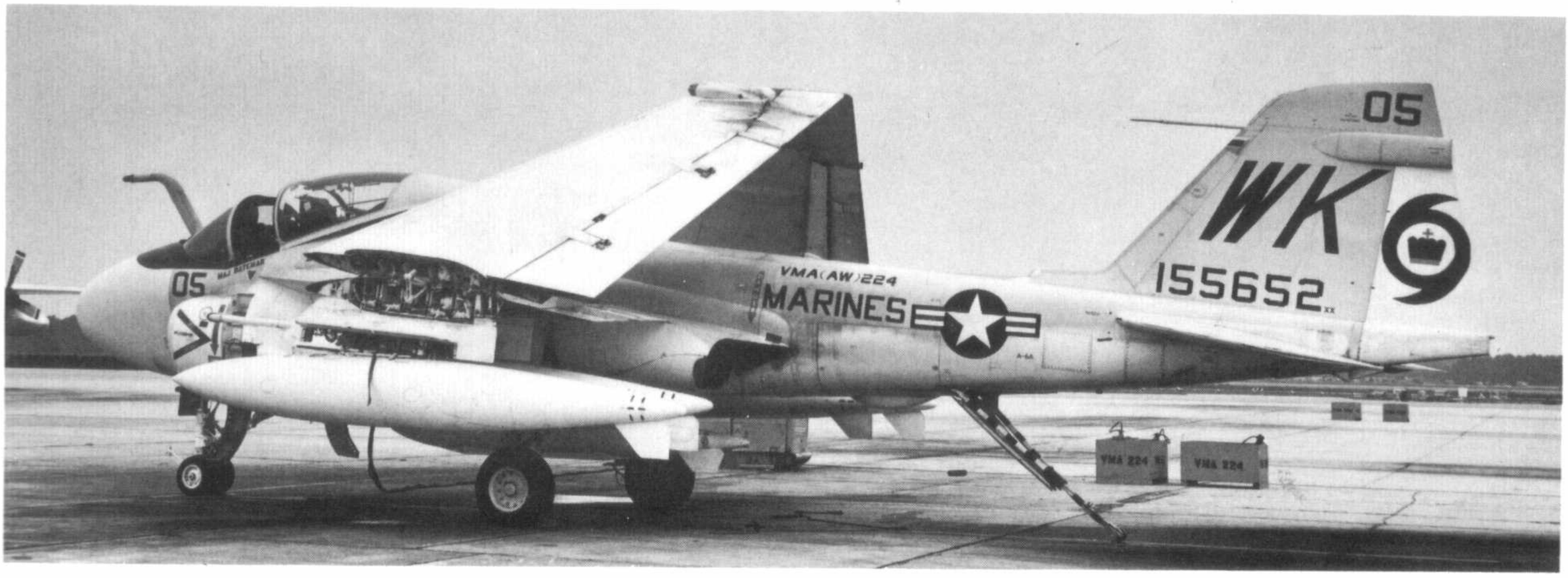
Proposal of Design 128S or an A-6E goes back to July 1967. The A-6A utilizes 1950s' state-of-the-art avionics which, in an aircraft as complex as the A-6A, compounds maintenance and reliability problems. The A-6E proposal contained plans for (1) a new general purpose computer, (2) multimode radar and (3) a new weapons release system. Authorization to proceed with sub-systems procurement came in 1969 and the A-6E prototype was provisionally accepted in December 1969.

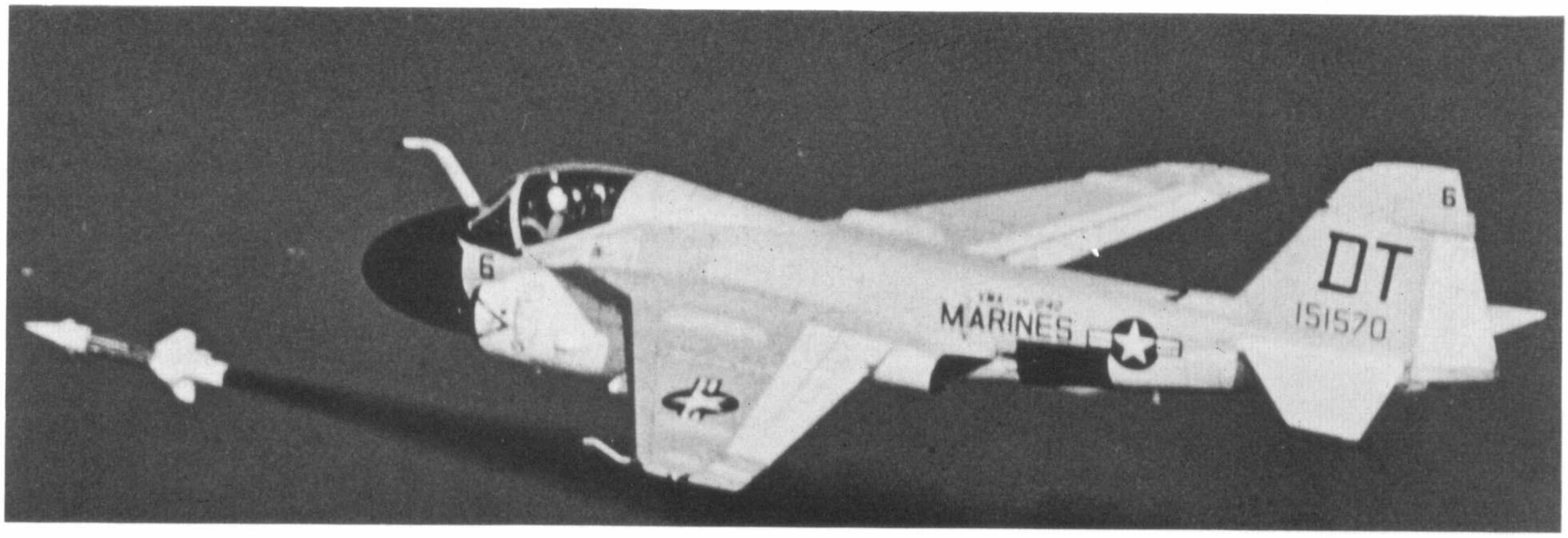
When the prototype began flight tests in March 1970, it was to evaluate the IBM AN/ASQ-133 solid-state digital computer already proven in the EA-6B Prowler, A-7 Corsair II and the USAF's General Dynamics F-111. By August 1970 the weapons release system was under flight test. The new system features solid-state design and new switching circuits combined with increased self-test capability. Last to fly (November 1970) was the Norden AN/APQ-148 multi-



Wide stance. Main gear track is 11 ft. 0.3 in., giving good stability on pitching carrier decks. Speed brakes 'bleed' open when aircraft hydraulic system is not pressurized.
(Photo: Author)

Project Stormfury. *That's the marking on the rudder of this VMA(AW)-224 A-6A at MCAS Cherry Point, N.C. during 1970.* Stormfury *is annual hurricane research and modification programme.*
(Photo: D. Kasulka)





mode radar, replacing separate track and search radars of the A-6A. The new radar performs the detection, tracking and terrain clearance functions simultaneously. There are no airframe or engine changes.

In 1972 Grumman was awarded a contract for long leadtime items which will be used in a major retrofit programme to update the A-6As now in Fleet service. In 1973 36 A-6As will be modified. This work is in addition to FY 1970, '71 and '72 contracts for production A-6Es.

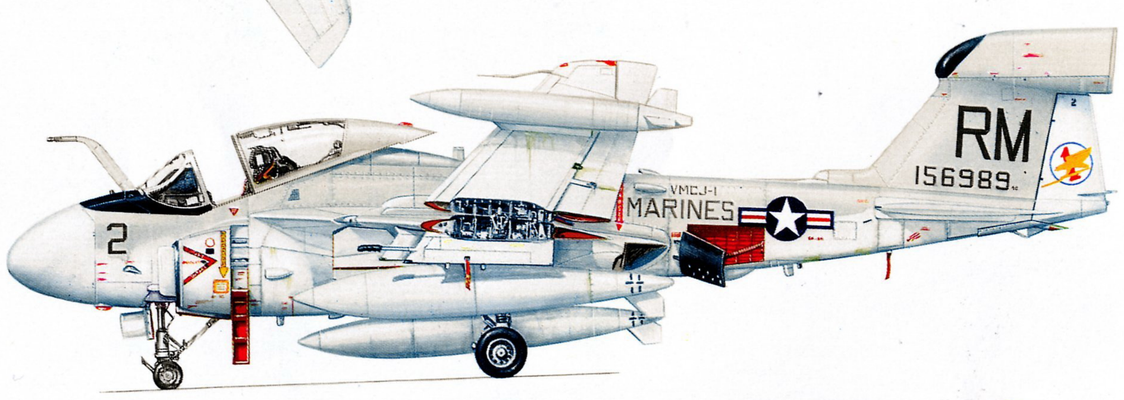
In a further move to enhance capability of some A-6Es, the Navy plans to outfit them with FLIR systems (see A-6C) to detect, identify and attack enemy targets in darkness. The programme is known as TRAM and is an outgrowth of the A-6C TRIM programme. In the new aircraft (A-6 suffix not yet announced) the B/N will have FLIR and radar displays. The radar will detect the target at relatively long range and once the target is fully recognizable on the FLIR display, tracking will be done with the detection and ranging system. The computer then works out the bombing run. The proposed system is expected to be very useful against non-significant (non-reflective) radar targets.

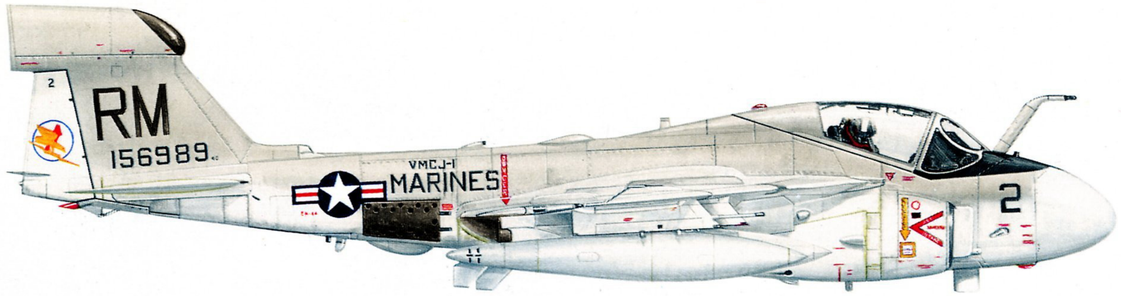
EA-6A—The A-6A was about one year from squadron service when the first variant, the EA-6A (formerly A2F-1H), was approved for production. The contract for the new tactical ECM (Electronic Counter Measures) aircraft was finalized in March 1962. Its primary ECM mission is to support strike aircraft and ground troops by suppressing enemy electronic activity and obtaining tactical electronic intelligence within a combat area. The carrier-suitable EA-6A features limited all-weather capability with conventional and special weapons.

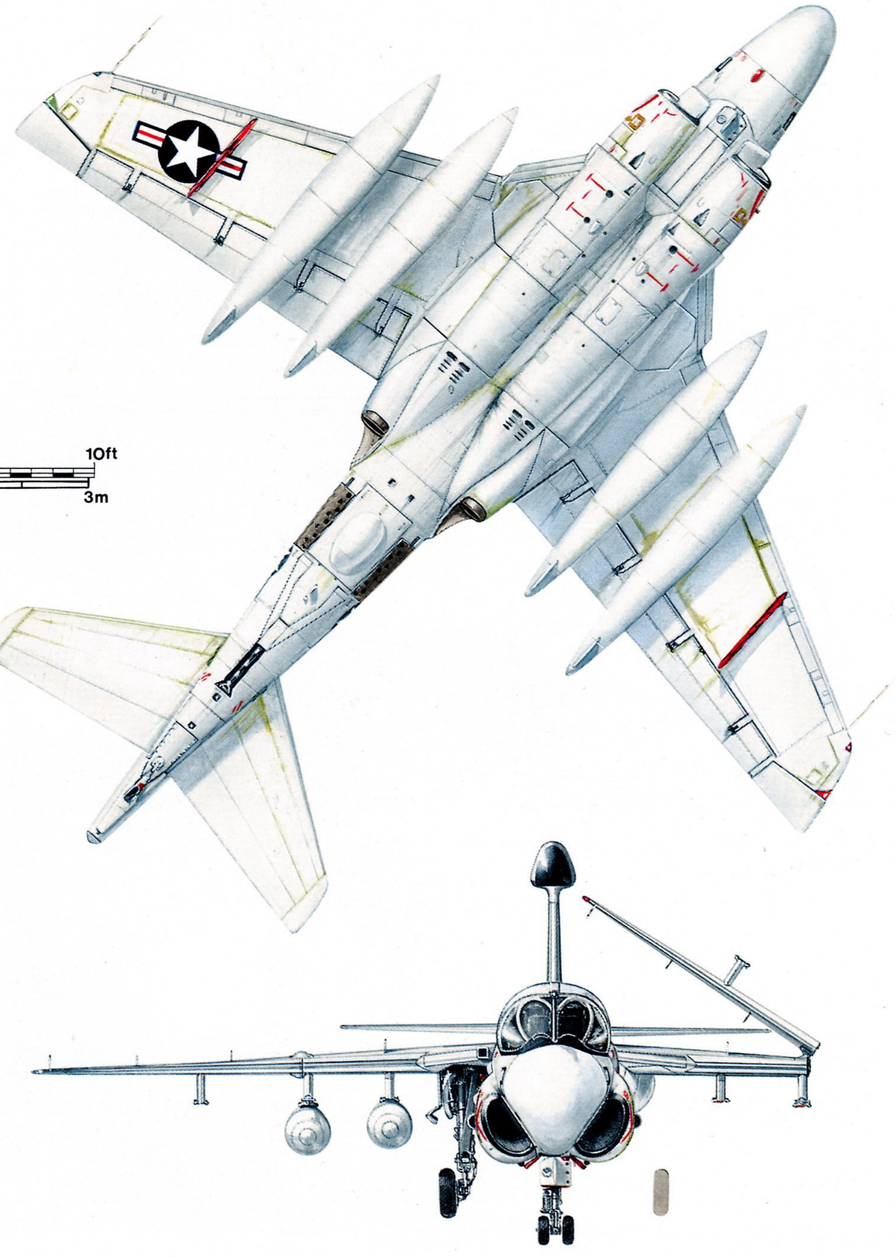
The aircraft, which completed its first flight on April 26 1963, is currently only in service with

Fire-away! A-6A of USMC attack squadron VMA(AW)-242 Batmen fire USN Maxson Electronics AGM-12 Bullpup missile. Tail markings of USMC A-6s have become considerably more colourful since this photo was taken in 1966.
(Photo: Unknown)

One of VMA(AW)-533's Hawks comes home to roost at NAS Atsugi, Japan, in January 1971.
(Photo: H. Nagakubo)

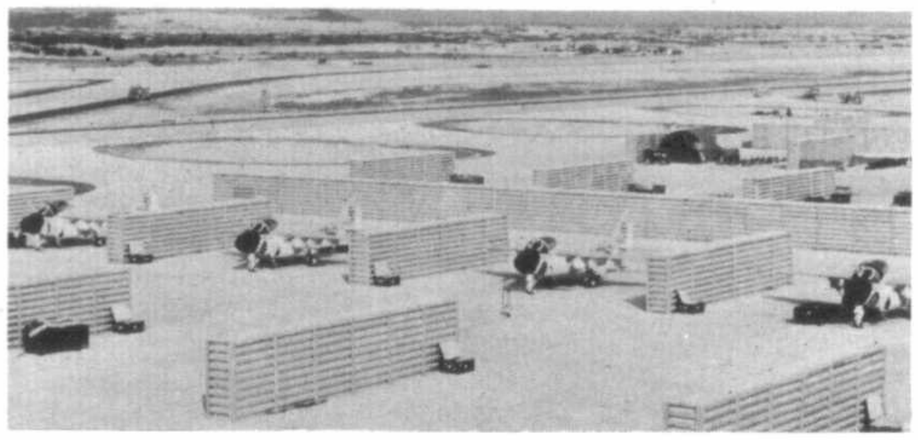






The carrierborne Grumman EA-6A is equipped for ECM (Electronic Counter Measures) roles and is in service with the US Marine Corps. Code letters RM apply to the Marines First Composite Reconnaissance Squadron (VMCJ-1). This EA-6A was assigned to the Marine Corps Air Station at Iwakuni, Japan. Period, 1970.

M. Trim/T. Hadler/D. Palmer *©Profile Publications Ltd*



Safety revetments at Da Nang, Vietnam. A-6As of VMA(AW)-533 Hawks *(ED) sit under the merciless sun and are also soaked in tropical humidity, not exactly the best environment for this complex aircraft.*
(Photo: Unknown)

Aboard USS Saratoga *in 1964. Black and white test marked A-6A also carries markings of Weapons System Test (W), Service Test (S) and Flight Test (chevron).*
(Grumman 64446)

the US Marine Corps, where it replaced the Douglas EF-10B (originally the F3D Skyknight). Basic airframe and engines are as in the A-6A but wing pods containing electronic equipment and a large faired radome on top of the vertical fin give this model a very distinctive appearance.

Two contracts have been let for the EA-6A. To complete the first order for 12 aircraft, A-6As were taken off the assembly line and modified to the new configuration. A second contract for 15 EA-6As was awarded in December 1967. These constituted new airframes and were financed from FY 1968 appropriations.

EA-6B Prowler—This variant represents the most radical departure from the A-6A configuration in that it is an unarmed, four-seat aircraft solely configured for tactical electronic warfare; the Grumman designation is Model 1128.

Construction of the pre-production prototype EA-6B (BuNo. 149481; c/n M1) began in 1967 and was built from an A-6A (BuNo. 149481; c/n 15) by 'splicing-in' a 40-inch section forward of the cockpit. This prototype flew for the first time on May 25, 1968, with Grumman pilot Don King at the controls. A second EA-6B (c/n M2) was built by similar conversion of another A-6A (BuNo. 149479; c/n 13). C/N M1 and M2 are now designated NEA-6Bs. Yet a third, but non-flying, EA-6B prototype (BuNo. 148615) emerged

'Loaded for bear!' A-6A (BuNo. 147618) loaded with 500-lb. bombs has nose wheel off the deck as NATC-assigned aircraft leaves USS Saratoga *during 1964 BIS Trials.*
(Photo: Grumman)

'Oh, my achin' back!' Heavily loaded A-6A (BuNo. 149483) of Weapons System Test Section of NATC Patuxent River, Md., is burdened by flat of starboard tyre.
(Photo: AAHS L2301)

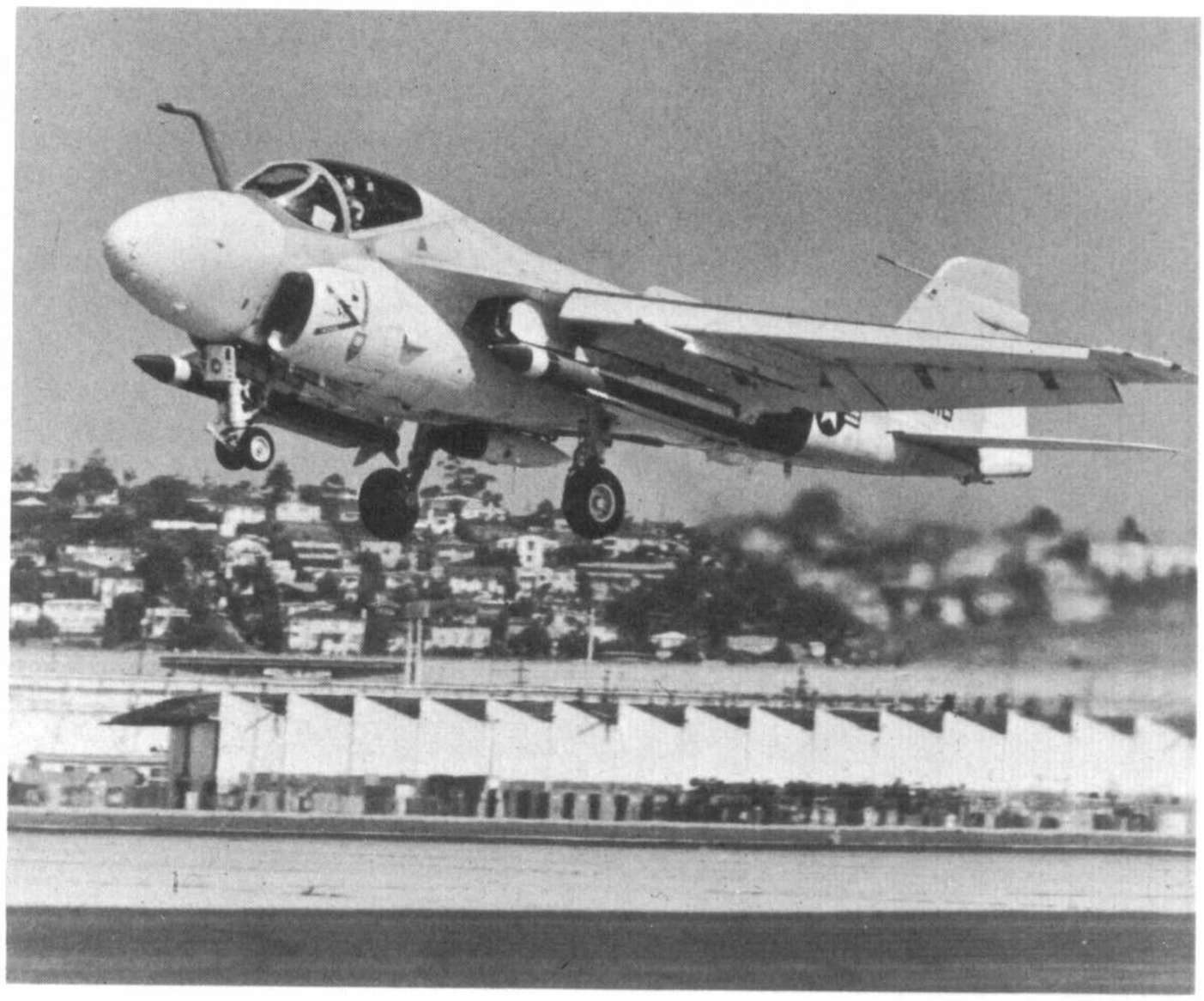
from Grumman's shops, designated as an electronic test article. This test A-6 was installed in an anechoic chamber for thorough testing of the proposed EA-6B electronic warfare systems—the chamber design preventing interference with local radio and TV reception.

The EA-6B differs from the A-6 airframe in various ways. For example, by the addition of a forward cockpit and equipment bay, by incorporation of a pod-shaped fairing on top of the vertical fin and by strengthening the airframe structure to assure adequate operational fatigue life at maximum gross weights.

The five external store stations are retained and can carry ECM jamming pods or fuel tanks. The EA-6B Prowler also retains the Pratt & Whitney J52-P-8A engine but the uprated J52-P-408 is being installed in EA-6Bs from BuNo. 158544 onwards. Other EA-6Bs will receive this engine during major overhaul. Two aft-hinged canopies are used, as are the proven Martin-Baker Aircraft ejection seats. There are no fuselage speed brakes.

At present the aircraft carries 8,000 pounds of avionics internally and accommodates another 950 lb. on each of the four wing pylons and along the fuselage centreline. With a gross weight of 51,000 lb., including pods, the EA-6B attains 510 knots (587 mph) at sea-level. It can manœuvre at 5,5g and its range and altitude are compatible with the A-6A.

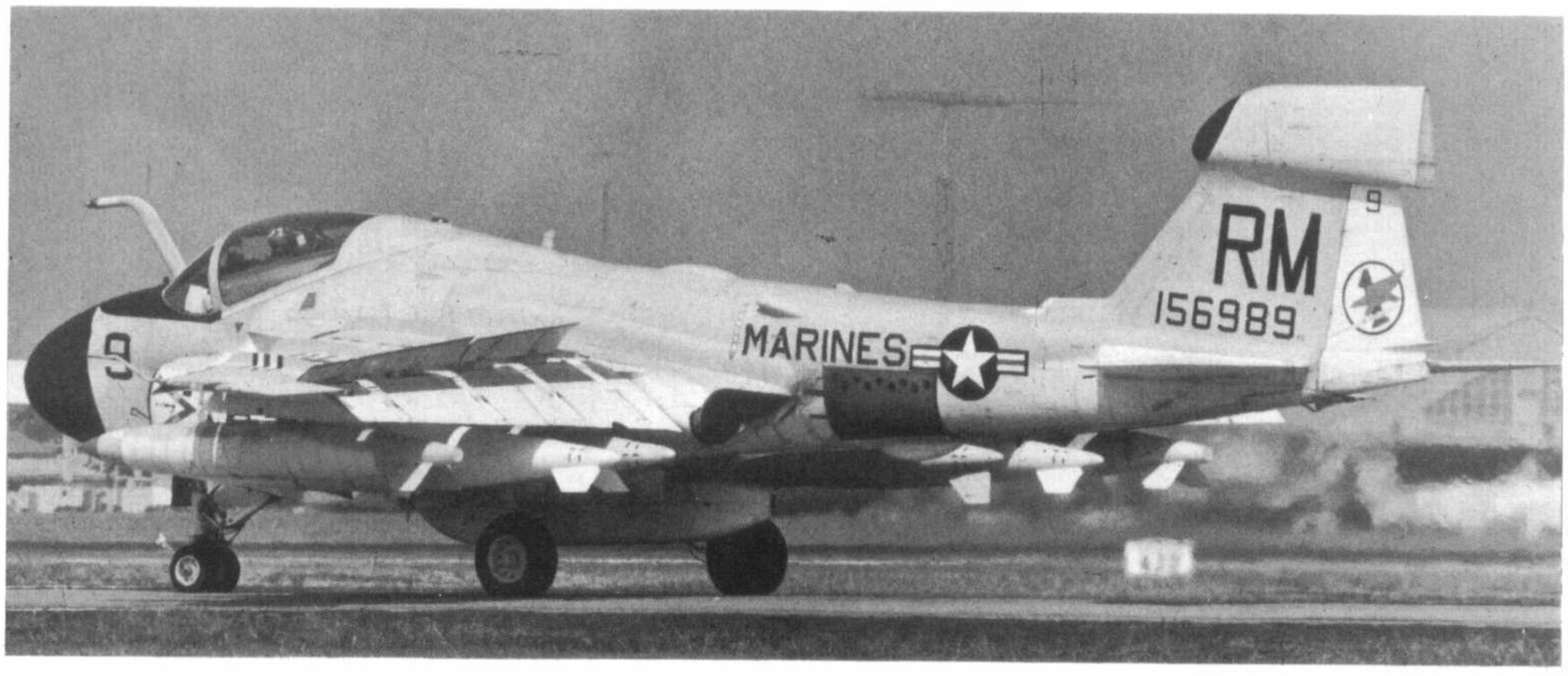
The multiple ECM roles the EA-6B can perform include those of a stand-off jammer, an ECM escort or protection penetration aircraft, depending on the desired mission. To date, the



Standard ARM missiles. A-6B carrying General Dynamics Standard Anti-Radar Missiles on inner wing pylons takes off from Lindbergh Field, San Diego, Calif. 'Pock marks' on nose radome are small antennas.
(Photo: General Dynamics)

A-6C Prototype. BuNo. 151568 at Grumman's Calverton Flight Test Facility in the Fall (autumn) of 1969. FLIR and LLL-TV are housed in centreline turret; large shutter covers mechanism when sensors are not in use.
(Photo: Grumman P306180)

A-6E prototype. BuNo. 155673 is A-6A (shop 404) and was used to evaluate new avionic systems destined for production A-6Es. A-6E marking on fin is Grumman-originated and coloured light blue.
(Photo: Grumman)



Long mission finished. Judging by the six-pylon fuel tanks, this EA-6A of VMCJ-1, MAW-1 (RM), has just completed a long mission. Centreline store is AN/ALQ-99 jamming system powered by air-driven generator. EA-6A is seen landing at Yokota Air Base, Japan in November 1970.
(Photo: H. Nagakubo)

6

A

B

C

D

E

F

G

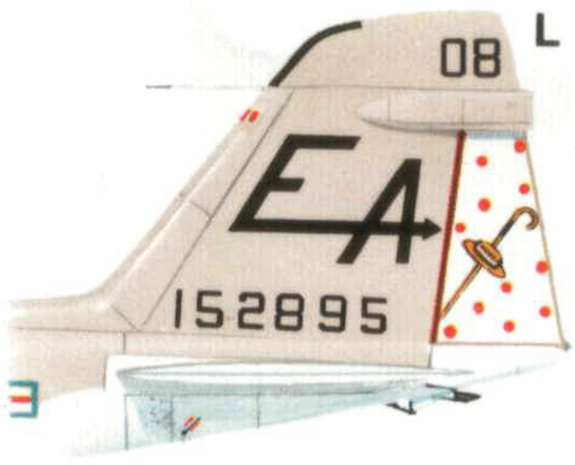
H

I

J

K

L



M. Trim/T. Hadler/D. Palmer ©Profile Publications Ltd

aircraft has successfully flown against actual captured and simulated Soviet radar threats.

Heart of the EA-6B's ECM systems is the AN/ALQ-99 tactical jamming system (TJS) that generates high power jamming signals through specially-designed, low-drag pods, each of which has its own turbine-driven, alternating current power source. Other ECM equipment includes a radar deception transmitter and the communications jamming system.

Besides the pilot, there are three naval flight officers (NFO) whose duties include operation of the ECM equipment. The senior NFO sits next to the pilot and operates or monitors one-half of the frequency coverage of the TJS. The second NFO, seated behind the first, handles the other half of the TJS. The third NFO is responsible for communications jamming.

The three pre-production prototypes (M1–M3) were followed by five prototypes, (P1-P5). These underwent the rigours of BIS Trials and carrier suitability tests aboard USS *Midway* during the spring and summer of 1970. Trials included flights against radar ranges at Eglin Air Force Base, Florida, in addition to extensive work at the Naval Air Test Center, NAS Patuxent River, Maryland.

Intruder Block Changes

Numerous major airframe and avionic changes have been made on the A-6 on the production line and during cyclic overhaul since entering production in 1960. Primarily, changes have been for increased reliability. Changes occurred at c/n 200, 246, 310, 359, 373, 451 and 476.

- C/N 200 (BuNo. 152891) includes canopy operation without having to operate either engine. Three search radar modifications and the pilot's vertical display.
- C/N 246 (BuNo. 152937) includes boresight weapons delivery mode, several changes to search and track radars as well as other reliability changes.
- C/N 310 (BuNo. 154170) changes were once again in the interest of reliability. At this point, Grumman also took the first steps toward elimination of the track radar, a sign of the coming A-6E. The search radar was modified to perform some tracking functions. Fuselage speed brakes were deleted and the heavier nose wheel of the EA-6B was also included. The latter improves catapult characteristics and permits heavier gross takeoff loading.
- C/N 359 (BuNo. 155628) changes affect the external appearance of the aircraft. White Neoprene coatings replaced black material. This change is also incorporated during overhaul.
- C/N 373 (BuNo. 155642) aircraft include provisions for wing-mounted minigun pods, primarily for air-to-ground use but also with limited air-to-air capability.
- C/N 451 (BuNo. 155720) and block 476 (BuNo. 157017) changes incorporate a zero/zero Martin-Baker Aircraft rocket-powered ejection-seat, making ejection at zero air-speed/altitude possible.

Planned use of the EA-6B wing, with its additional hardpoints, did not materialize. The wing is also configured for addition of high-lift devices should improvement in carrier take-off and landing be required.

Not Proceeded With

A version of the A-6A that never proceeded beyond the study stage was a three-seat trainer, tentatively known as the TA-6A. The third seat was to have been aft of the existing two. However, this approach was not considered practical or cost-effective and therefore cancelled in 1964. Instead the Navy and Marine Corps procured the TC-4C based on the commercial Grumman Gulfstream I.

In 1966, Grumman proposed a variant which was company-designated 128NT—a long-range navigation trainer for the international (European) market. This derivative would have used the A-6A airframe, omitting those systems not required for the trainer mission and replace these with off-the-shelf navigation training equipment. No aircraft was built.

For the light attack (VAL) competition in 1962,[1] Grumman entered the fray with a single-seat version of the A-6A which retained the J52 engines rather than the suggested turbofan TF30. This model was designated 128G-12 and actually proceeded to the mock-up stage. It is of note that the G-12 featured folding horizontal

[1] *Profile No. 239: A-7 Corsair II* also provides details of this VAL competition.—Author

Key to colour side views

6 A-6A Intruder *of VA-65, the 'Tigers'. For a short time in 1966, A-6s aboard USS* Constellation *had two-tone green camouflage to test for effectiveness in sorties over Viet Nam.*

A: *Wry humour; an unofficial badge circulating among crews engaged in Viet Nam operations.*

B: A-6A *of VA-75, the 'Sunday Punchers'. Period, 1972; letters AC denote Carrier Air Wing Three or CVW-3.*

C: A-6B *of NMC, the Naval Missile Center, Pt Mugu, California; mid-1972.*

D: A-6A *of VA-128, the 'Golden Intruders'; late 1967. Tail code NJ stands for units of (West Coast) Replacement Carrier Air Wing Twelve or RCVW-12.*

E: A-6A *of VA-35, the 'Panthers'. Period, 1969; code NG, CVW-9.*

F: A-6A *of VMA(AW)-225, the 'Vagabonds'. Code letters CE, unlike USN, are applicable solely to the squadron; Marine Attack (All Weather) Squadron 225, First Marine Air Wing.*

G: A-6A *of VA-85, the 'Black Falcons'; period, 1968. Code AE for CVW-6.*

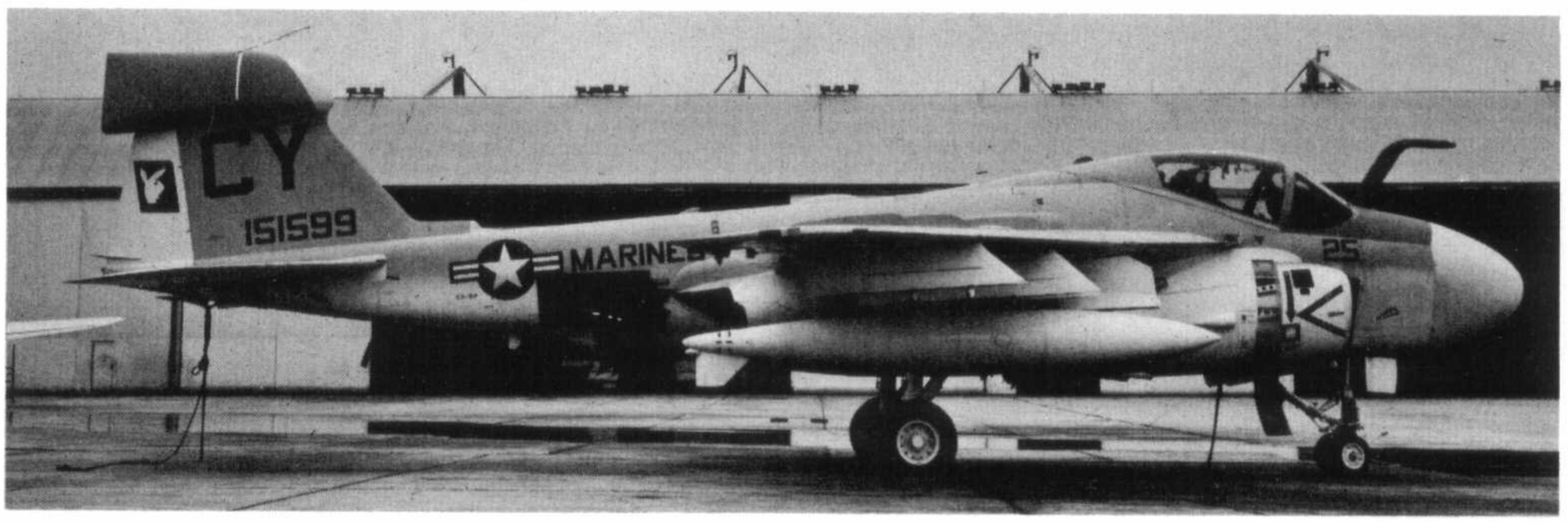
H: A-6A *of Marine Squadron VMA(AW)-242, the 'Batmen'; period, 1970.*

I: A-6A *of VA-65, the 'Tigers'; AG stands for CVW-7. Period, mid-1971.*

J: A-6A *of VMA(AW)-224 at MCAS, Cherry Pt, NC; period, 1969.*

K: A-6A *of VMA(AW)-121, the 'Green Knights'; period, 1969.*

L: A-6A *of VMA(AW)-332, the 'Polka Dots'; period, mid-1969.*



EA-6A of VMCJ-2, MAW-2 (CY), at MCAS Cherry Point, N.C. VMCJs are composite reconnaissance squadrons that also operate McDonnell Douglas RF-4B photographic aircraft.
(Photo: D. Kasulka)

stabilizers in an effort to place 139 of these aboard a *Forrestal*-class carrier. Two Mk. 12 20-mm. cannon were to have been contained in the lower portion of the nose. Grumman's whole proposal was based on the fact that this aircraft could be delivered almost immediately, since it drew so heavily from the A-6A. However, this did not appear to influence the evaluators and they chose the A-7A Corsair II.

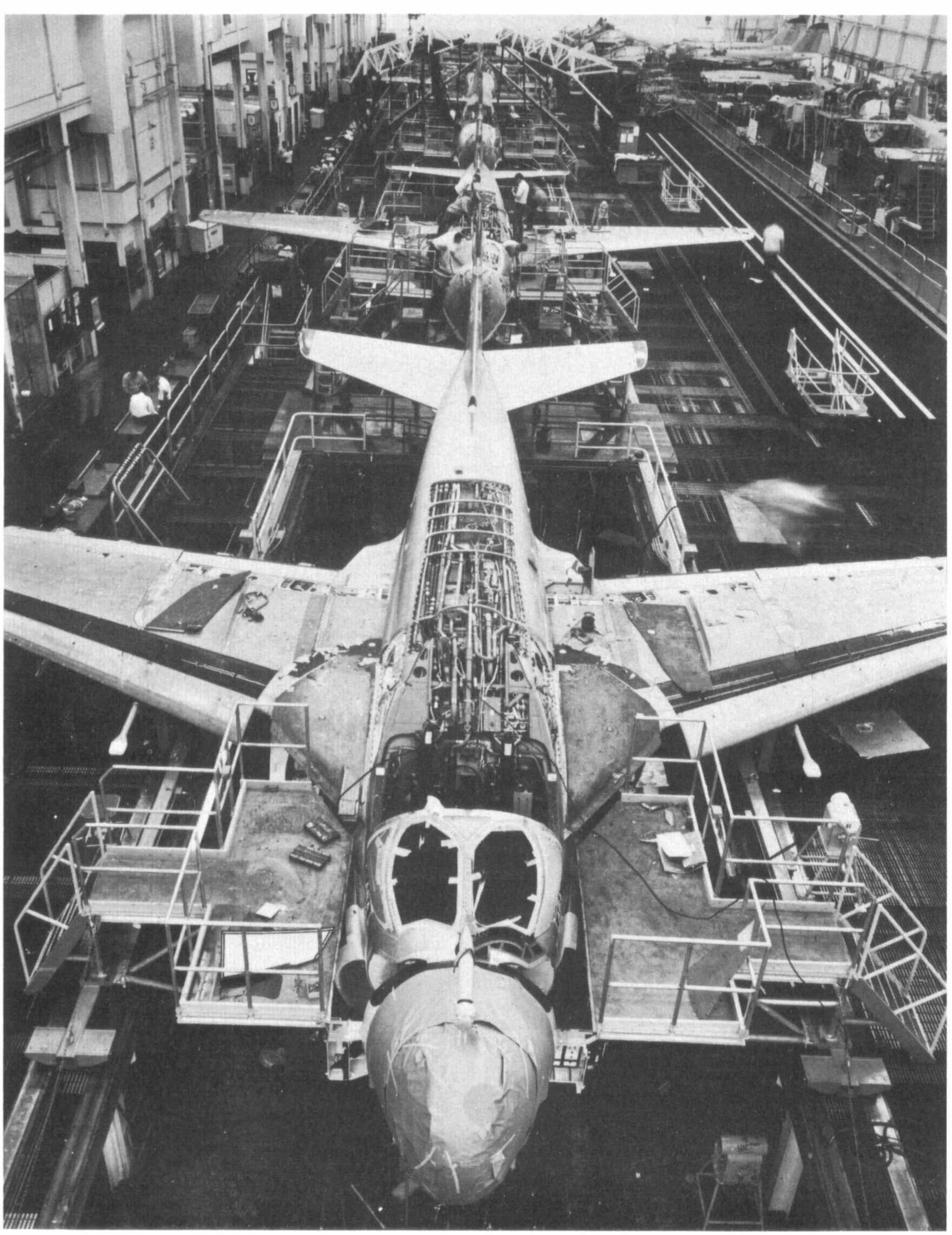
Attack Missions

In its primary role as an all-weather, low-altitude attack aircraft, the A-6 is used in close air support of ground forces or in long-range delivery of conventional or special weapons. Some typical missions are now quoted.

The close support mission (CAS) calls for loiter-on-station at 5,000 feet and uses high altitude cruising between base and combat area. One-hour loiter is possible 635 nautical miles from base with internal fuel while carrying four Bullpup AGM-12 missiles. With 30 × 500-lb. bombs, a 330-mile radius is attainable with about 1-hr. loiter. If maximum time on station is required, the A-6 can carry three 300-gal. external tanks for 5-hr. loiter at an 8-mile radius; 2 × 1,000-lb. bombs are carried.

For most CAS missions, take-off over a 50-ft.

Feasibility study. An A-6A (BuNo. 149937) was converted to tanker configuration in April 1966. Tests proved that KA-6D would be practical replacement for KA-3 tankers and finally beat out KA-7F in vigorous competition. (Photo: Grumman)

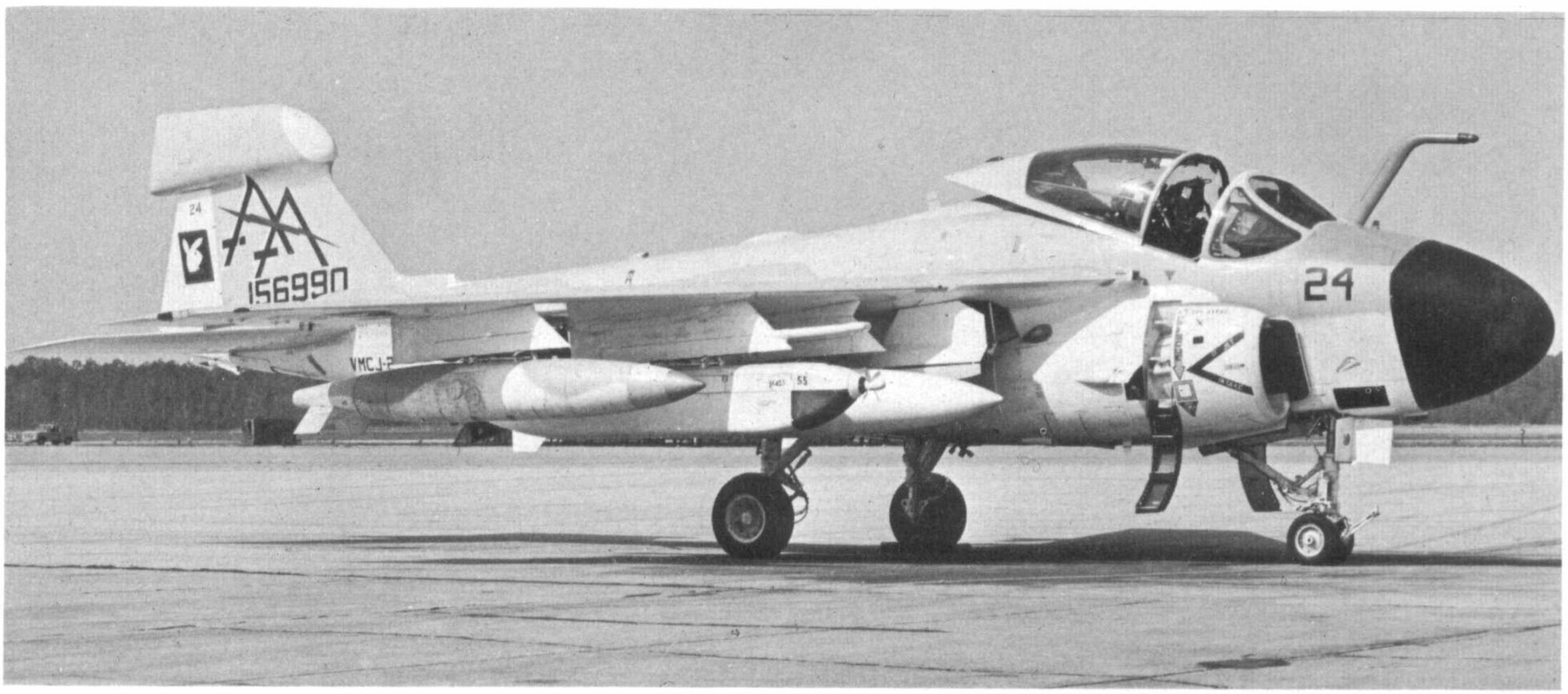


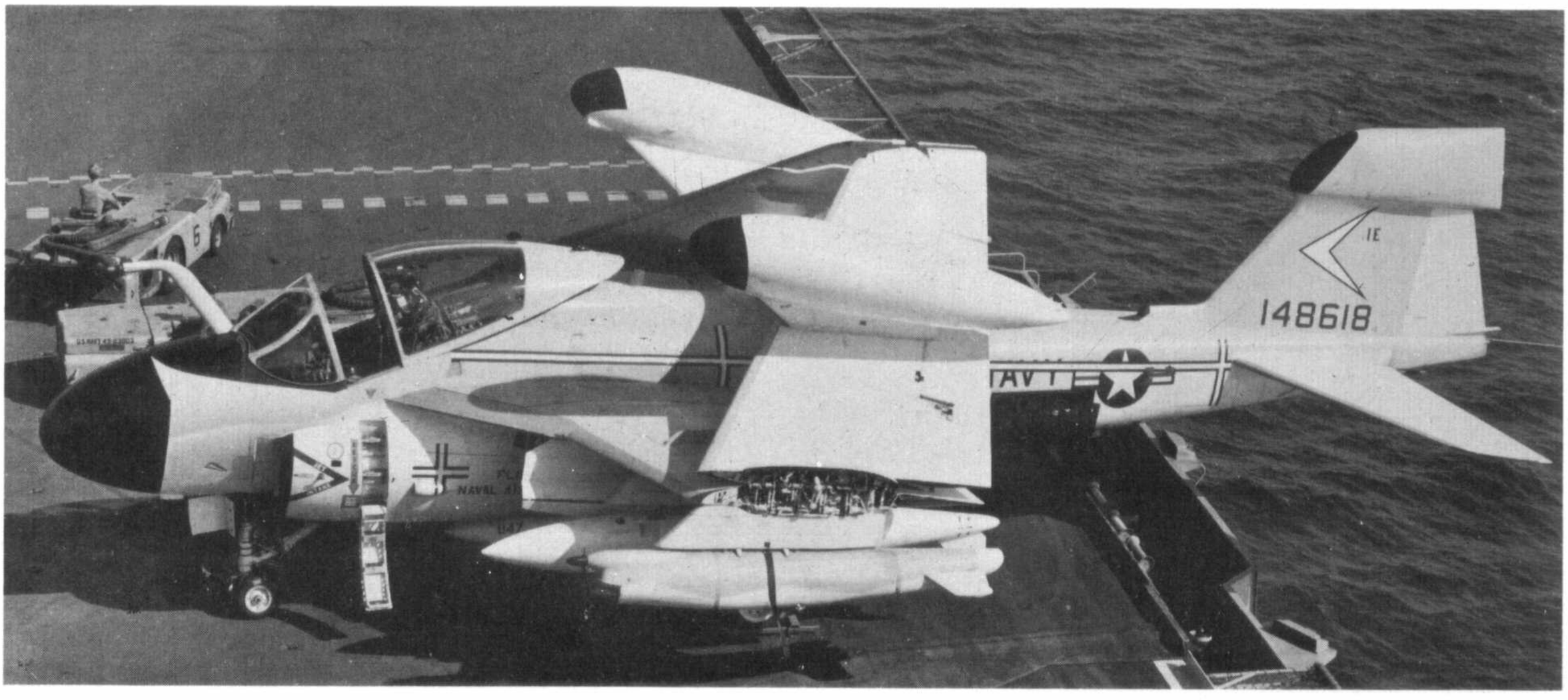
Assembly line at Grumman. Complex backbone of A-6A reveals numerous hydraulic lines, cables and pneumatic lines. Highest production rate of Intruder was in Fiscal Year 1967 with 122 aircraft. (Photo: Grumman)

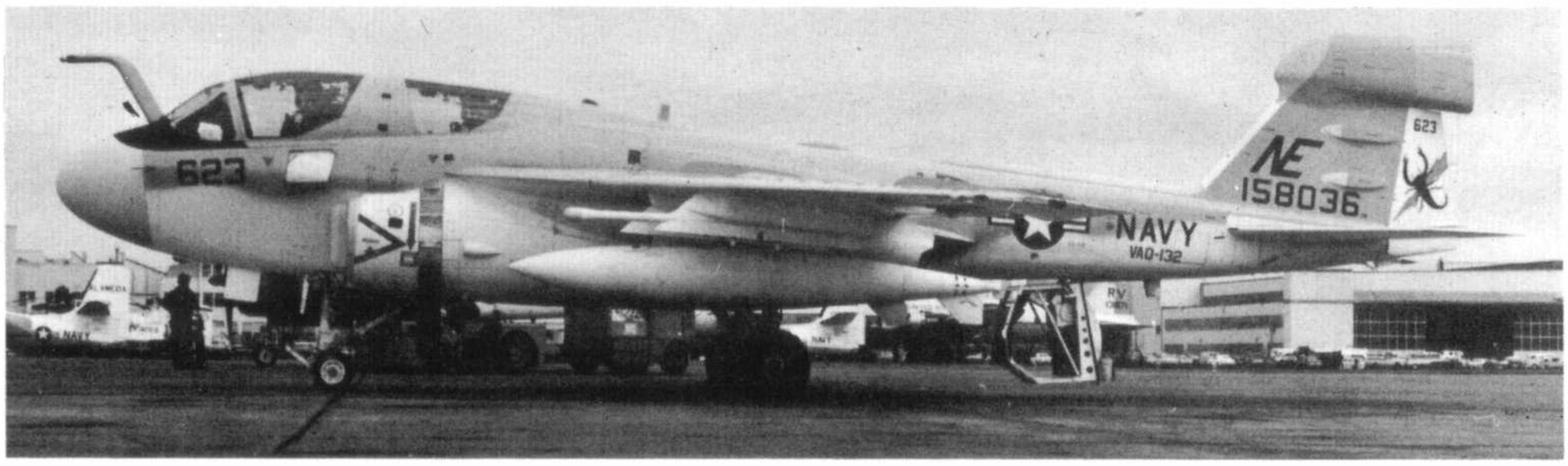
Detached to CVW-17. In April 1971 several VMCJ-2 EA-6As were assigned to CVW-17 (AA) aboard the USS Forrestal *for Mediterranean cruise. USMC adopts USN marking when aboard ship.* (Photo: J. Sullivan)

Aboard USS Kitty Hawk *in 1966. EA-6A (BuNo. 148618) carries Navy Flight Test NATC markings during carrier qualifications. Large pods on folded wing panel are ECM countermeasure equipment as are the pods with the wind-driven generators (at fold joint). Horizontal and vertical black stripes are for photographic reference.* (Photo: Grumman)

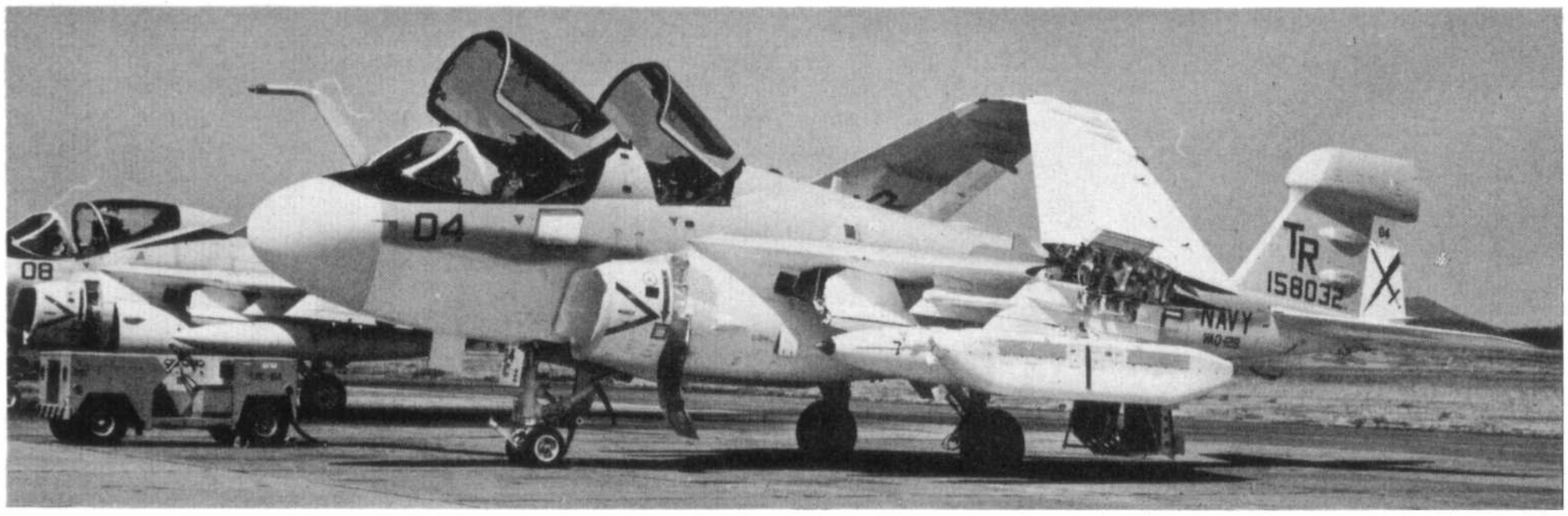
149937
NAVY
AD
151594
534
NAVY


24
156990
24


148618
NAVY



Ready for Deployment. VAQ-132 Scorpions became first EA-6B squadron to deploy to Southeast Asia. Here BuNo. 158036 is at NAS Alameda in 1971. (Photo: P. Mancus)



VAQ-129 New Vikings. *EA-6B became US Navy's prime electronic warfare aircraft in early 1971 when VAQ-129 was assigned task of training EA-6B Prowler crews at NAS Whidbey Island, Wash.* (Photo: A. Swanberg)

obstacle requires 2,900 to 3,000 ft. Rocket-assisted take-off will reduce this distance to less than 2,000 ft.

A typical long-range mission might be to a target nearly 1,000 miles from base with 285-kt. (330-mph) cruise in and out at sea-level. In-flight refuelling can easily add another 500 miles of range. For high altitude weapons delivery, the A-6 provides a mission radius capability of about 1,500 miles with one store and four 300-gal. external tanks.

There are countless variables influencing mission capability; suffice to say that payload, range to target, availability of in-flight refuelling service and weather conditions are just a few of these variables.

Intruder Deployments

A period of just over five years elapsed from first prototype flight to production Intruders in combat. Since then, from July 1965 onwards, countless sorties have been flown over Southeast Asia. Intruders also continue to constitute a strong force in the Mediterranean as part of the US Sixth Fleet. All models of the A-6 family have seen combat with exception of the A-6E.

After Attack Squadron Seventy-Five, VA-75 ('Sunday Punchers') graduated as the first fully-trained A-6A unit in 1964, they joined the Fleet. On July 1 1965, they were launched from USS *Independence* to attack key highway bridges at Bac Bong and other targets in the area about 80 to 125 miles south of Hanoi. There was also a night attack against the power generating plant at Thanh Hoa, some 80 miles s. of Hanoi. This mission was significant because the target was located by radar—graphic evidence that no target was secure from night attack. For 96 days VA-75 deployed before being relieved by VA-85 ('Black Falcons') aboard the USS *Kitty Hawk*.

The Black Falcons flew against Viet Cong strongholds north of Saigon and unleashed heavy night strikes. The A-6As approached the targets at low altitude and high speed before climbing to altitude before beginning the attack. But often they would operate alone or in pairs, to make radar detection more difficult. The effectiveness of the A-6A must have left its mark on the North Vietnamese because after one spectacular night raid they announced that the Americans had escalated the war by sending B-52s[1] into the Haiphong area—an unexpected tribute to the A-6A's payload capability.

Not to be left out, the US Marines ferried VMA(AW)-242 and VMCJ-2 across the Pacific in 1966 in order to support their ground troops in Vietnam. By 'island-hopping' they arrived in Da Nang on November 1 1966, and began flying strikes two days later.

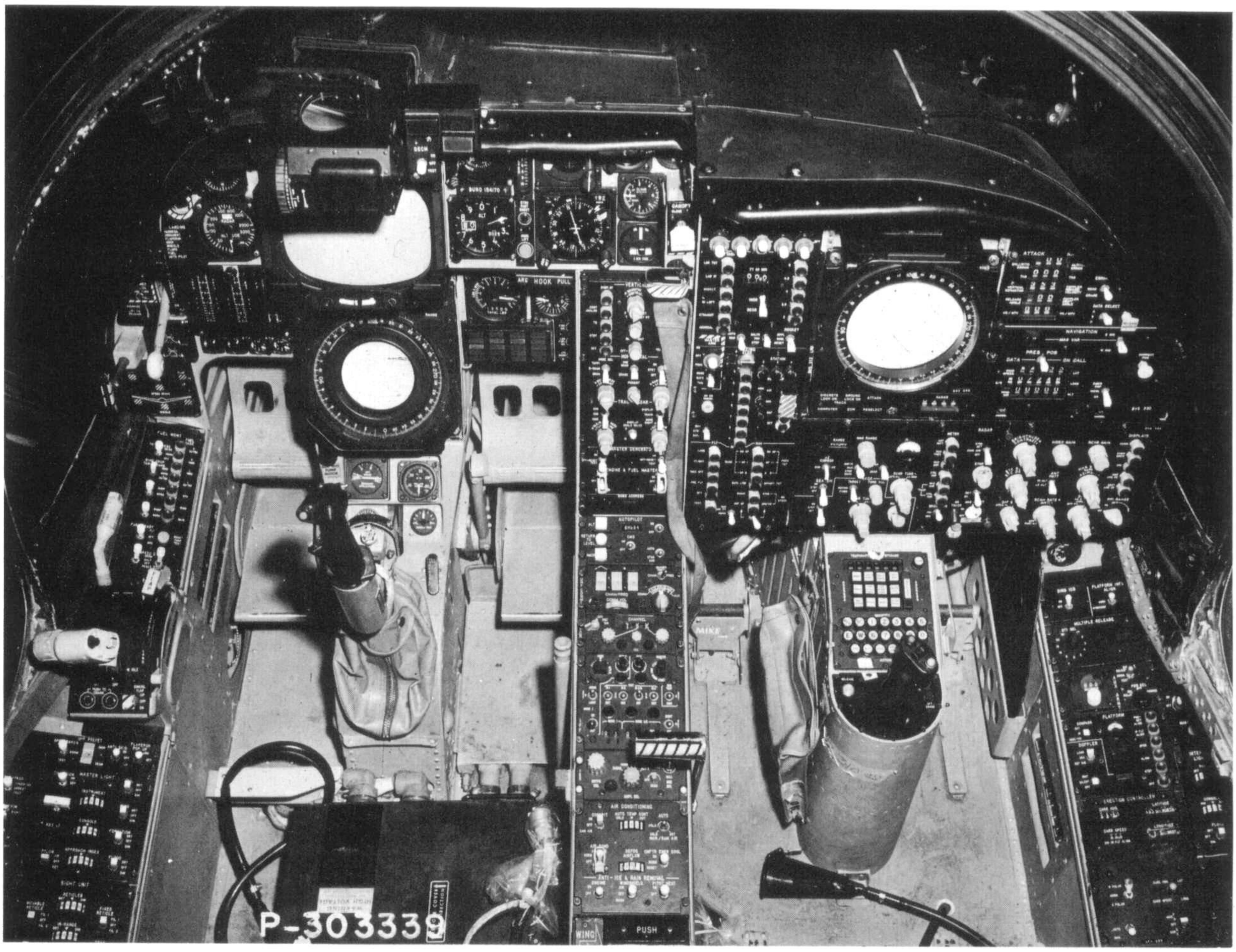
The A-6A build-up in Southeast Asia continued. VA-35 flew off the USS *Enterprise* and the Marines also sent VMA(AW)-224 and VMCJ-1. As squadrons and carriers left the line, others came to take their place in the relentless pounding of Viet Cong and North Vietnamese invaders. The seemingly never-ending rotation of squadrons came to an end on November 1 1968, when President Johnson ordered bombing of the North to be stopped. By then, the A-6 had been proven.

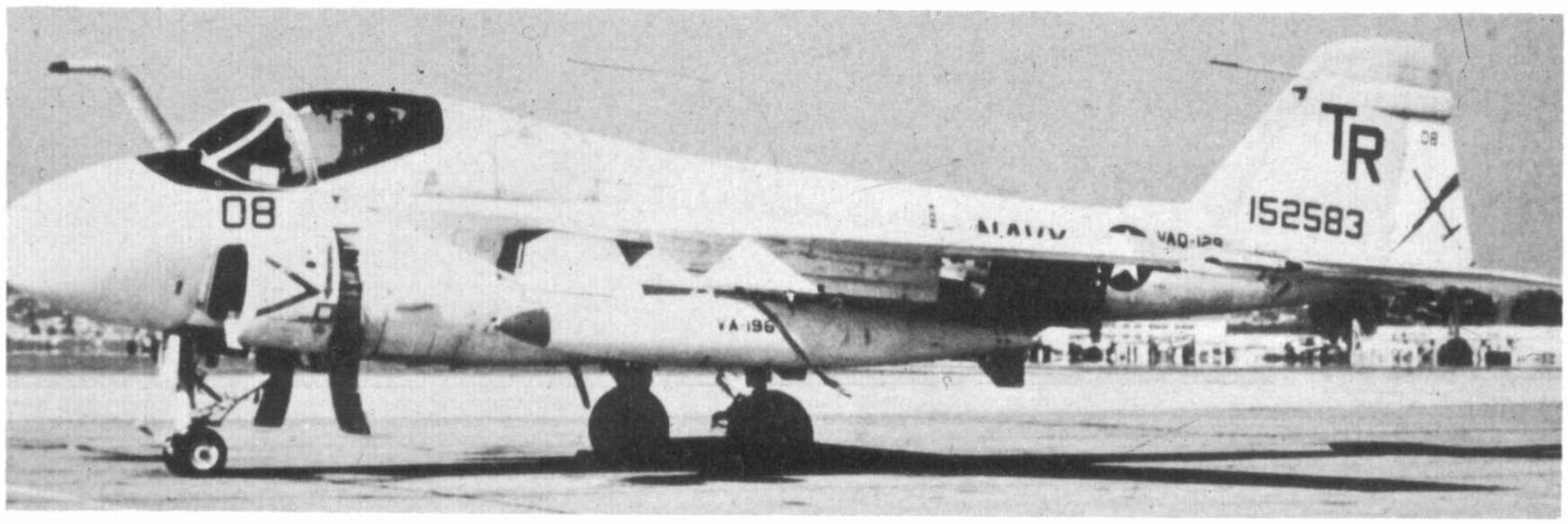
Endorsements came from all quarters. Typical is one lieutenant's comments: 'We prefer "goo", or darkness, as it means less enemy fire over the target'. Commander Ron Hayes, former Commanding Officer of VA-85, noted: 'The A-6A airframe is rugged and reliable. When the

An electronic world. An A-6A cockpit. The pilot has, starting at the bottom, the horizontal display (IP-690/A), which provides elevation scan, terrain clearance and all data displayed to the B/N. Above this is the vertical display (AN/AVA-1), which enables the pilot to manœuvre without reference to the outside world during all phases of the flight. Above is the lead computing optical sight. The B/N's display is the direct view indicator (DVI), which displays data developed by either the search or track radar. The slew stick enables the B/N to start and stop the attack sequence and control the search and track radars. (Photo: Grumman P303339)

[1] *Profile No. 245: Boeing B-52A/H Stratofortress.*

Variety of stores. In outer ring are 500-lb. Mk. 82 (behind) aircraft and 250-lb. Mk. 81 (left and right) general purpose (GP) bombs, with Grumman universal multiple bomb racks in foreground. Second ring includes Mk. 79 fire bombs (behind aircraft), 1000-lb. Mk. 83 GP bombs (left and right), LAU-10/A rocket launchers and 4 of the 5-in. Zuni rockets which they fire (right foreground), AERO 7D rocket launchers and 19 2.75-in. FEAR Mighty Mouse projectiles (left foreground) and some special weapons in front. Immediately behind A-6, left, are 2,000-lb. Mk. 84 GP bombs and, right, AERO 8A practice bomb containers. In front of wings, left, are 4 Sidewinder IC missiles and a 300-gal. refuelling store. In front of wings, right, are 5 Bullpup missiles and 5 300-gal. tanks are on aircraft.
(Photo: Grumman 62213)



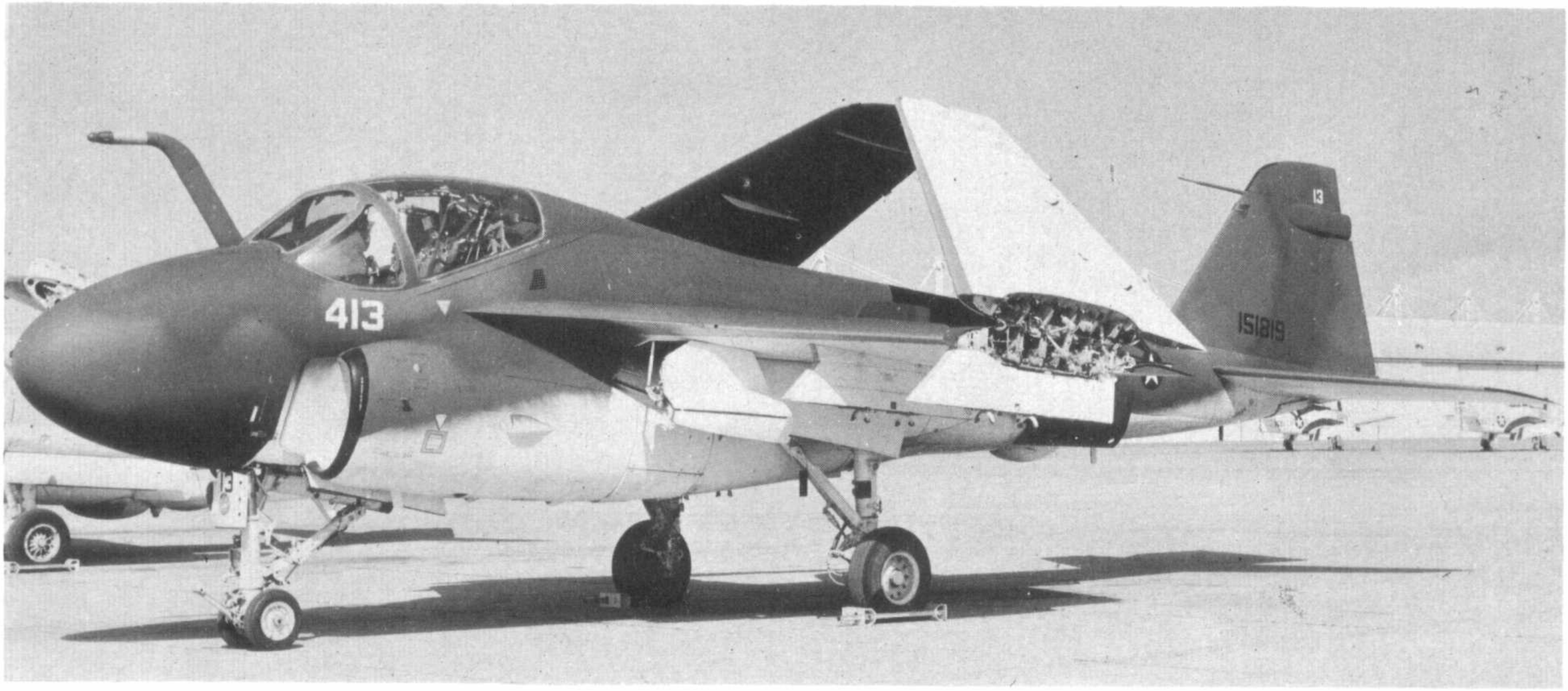


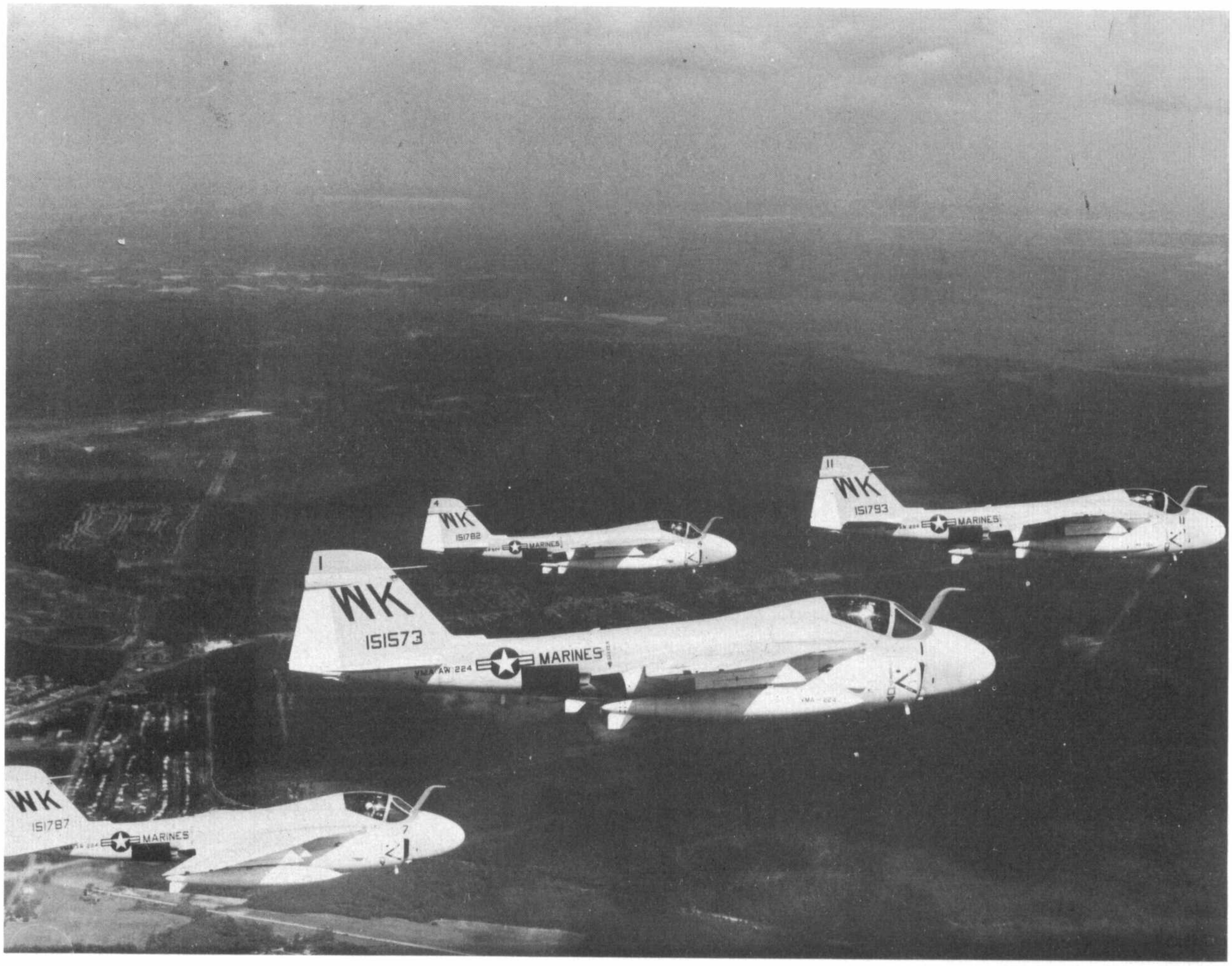
Intruder among Prowlers . . . A-6A with markings of VAQ-129 New Vikings, *who are assigned task of training replacement aircrews for the other VAQ or tactical electronic warfare squadrons at NAS Whidbey Island.*
(Photo: Unknown)

Golden Intruders, *VA-128, are flying this A-6A which still has original fuselage speed brakes panels; the brakes no longer operate as is evidenced by paint that remains unburned.*
(Photo: Bob Labuoy)

Grumman TC-4C trainer accommodates one A-6 pilot trainee, four B/N trainees and two instructors. Aircraft is equipped with simulated A-6 cockpit, complete attack-nav system and four B/N consoles. Shown is one of VA-42's TC-4Cs. VA-128 and VMAT(AW)-202 also use it. Nine were built; BuNos. 155722 to 155730.
(Photo: Author)

Camouflage evaluation, spring 1966. Upper surfaces were dark (almost black) green and deep blue while under surfaces remained flat white. National insignia was reduced in size. A-6A (BuNo. 151819) was assigned to VA-65 Tigers. *Photo at NAS Lemoore, Calif.*
(Photo: Unknown)





Formation of Marine Intruders. Carrying 300-gal. fuel stores these A-6As of VMA(AW)-224 are on a training flight out of their home base MCAS Cherry Point, N.C. Fuselage speed brakes are readily seen. (Photo: US Marine Corps)

situation dictates, the airplane can be muscled around within a "g" envelope comparable to that of a fighter. Even with heavy bomb loads the A-6 is still fleet footed.'

In 1968, Vice-Admiral Thomas Connolly, then Deputy CNO (Air)[1], said: 'This aircraft has been superlative. During the past five months, since November 1967, the Vietnamese weather, from a standpoint of being able to see targets, has been miserable. The A-6A has carried the load, both with respect to missions and quantitity delivered. It has measured up to our highest expectations.'

In 1970, the A-6C and KA-6D tanker joined operational squadrons VA-165 and VA-176, respectively. The A-6C spent the summer of that year flying from USS *America* in pursuit of moving targets on the Ho Chi Minh Trail. The A-6C was not without teething problems but enough was learned to realize that electro-optical sensors have a bright future.

The considerably less complex KA-6D reached Vietnam in early 1971 but enthusiasm for it was tempered by a 3-g airframe limit. The limit was imposed to extend aircraft life because several of them already had over 1,500 hrs. on the airframe. However, squadrons allocated the KA-6D praised its tanking capability and exploited the field carrier landing practice it provided and used it for numerous other training tasks. Visual bombing and air combat manœuvering are ruled out by the 3-g acceleration limit.

In early 1971, the EA-6B Prowler also joined the A-6 community when it arrived at NAS Whidbey Island. There it joined VAQ-129, the EA-6B aircrew replacement squadron. As training progressed, more EA-6B squadrons formed up. Then VAQ-132 had the distinction of being the first squadron to go aboard ship and deploy to Southeast Asia, sailing on USS *America* in the summer of 1972.

And finally, the A-6E, having completed NPE and BIS, also joined the A-6 community. As in the case of the A-6A, VA-42 was assigned the job of training A-6E replacement aircrews; they received the first A-6E in December 1971. The first Fleet squadron to transition to the second generation Intruder was VA-85, also at NAS Oceana, in early 1972.

[1] Deputy Chief of Naval Operations (Air).

TABLE I: A-6/EA-6B Airframe Production

A-6A Airframes

Fiscal Year	Qty.	Serial Numbers
1959	4	147864–147867
1960	4	148615–148618
1961	12	149475–149486
1962	24	149935–149958
1963	43	151558–151600
1964	48	151780–151827
1965	64	152583–152646
1966	33	152891–152923
1967	31	152924–152954
	48	154124–154171
	43	155581–155643
1968	82	155644–155725
1969	32	156998–157029
Total	488	

A-6E Airframes

1970	12	158041–158052
1971	12	158528–158539
1972	12	158787–158798
1973	21	—

EA-6A Airframes

Contractual requirements for the first dozen EA-6As were fulfilled by conversion of 12 A-6A airframes and therefore their serial numbers are carried over to the EA-6As. These are as follows:

Fiscal Year	Qty.	Serial Numbers
1959	1	147865
1960	2	148616 and 148618
1961	3	149475, 149477 and 149478
1962	none	
1963	6	151595–151600
1968	15	156979–156993
Total	27	

EA-6B Airframes

1969	5	156478–156482
1970	12	158029–158040
1971	8	158540–158547
	3	158649–158651
1972	10	158799–158810
1973	6	158811–158817

A-6B, A-6C and KA-6D Airframes

Contractual requirements for these airframes were fulfilled by random conversion of existing A-6A airframes. It is not possible to establish sequential serial numbers for any of these aircraft.

A-6B 10 Mod. '0' conversions in Fiscal Years 1962 and 1963; six Mod. '1' conversions in FY 1962 to 1965 and three PAT/ARM conversions in FY 1967.
A-6C 12 conversions in FY 1968.
KA-6D 51 aircraft between shop (block) numbers 28 and 243.

TABLE II: SPECIFICATIONS, A-6 FAMILY

Dimensions: Wing span, 53 ft. 0 in.; folded, 25 ft. 4 in. (all); overall length, 54 ft. 7 in. (A-6A); 55 ft. 3 in. (EA-6A); 59 ft. 1 in. (EA-6B); overall height, 15 ft. 7 in. (A-6A); 16 ft. 3 in. (EA-6A and EA-6B).

Weights: Empty, 26,350 lb. (A-6A); 28,643 lb. (EA-6A); 32,971 lb. (EA-6B). Max. take-off gross, 60,626 lb. (A-6A); 58,833 lb. (EA-6A); 63,177 lb. (EA-6B). Max. payload, 18,000 lb. (all).

Performance: Min. take-off distance, 1,940 ft. (A-6A); 3,280 ft. (EA-6A); 4,100 ft. (EA-6B). Take-off over 50 ft. obstacle, 2,610 ft. (A-6A); 4,090 ft. (EA-6A); 4,890 ft. (EA-6B). Service ceiling, 47,000 ft. (A-6A); 40,000 ft. (EA-6A); 38,000 ft. (EA-6B). Max. speed, 625 mph (A-6A); 563 mph (EA-6A); 571 mph (EA-6B). Cruise speed, 461 mph (A-6A); 450 mph (EA-6A); 466 mph (EA-6B). Stall speed (landing), 95 mph (A-6A); 104 mph (EA-6A); 118 mph (EA-6B). Ferry range, 3,160 n.mi. (A-6A); 2,790 n.mi. (EA-6A); 2,360 n.mi. (EA-6B). Note: performance based on full internal fuel, no-load condition, standard reserve fuel included.

ACKNOWLEDGEMENTS

The author is grateful for assistance rendered by D. A. (Dave) Anderton; Hal Andrews; Richard Dunne and Norman Gandia of Grumman; Captain W. E. Scarborough, USN(Ret), and all the photographers who contributed so generously of their work.

TABLE III: A-6/EA-6A/EA-6B Squadrons

A-6 Attack Squadrons, US Navy

VA-34	*Blue Blasters*	NAS Oceana
VA-35	*Panthers*	NAS Oceana
VA-42	*Green Pawns*	NAS Oceana
VA-52	*Knight Riders*	NAS Whidbey Island
VA-65	*Tigers*	NAS Oceana
VA-75	*Sunday Punchers*	NAS Oceana
VA-85	*Black Falcons*	NAS Oceana
VA-95	*Sky Knights*	NAS Whidbey Island
VA-115	*Chargers*	NAS Whidbey Island
VA-128	*Golden Intruders*	NAS Whidbey Island
VA-145	*Swordsmen*	NAS Whidbey Island
VA-165	*Boomers*	NAS Whidbey Island
VA-176	*Thunderbolts*	NAS Oceana
VA-196	*Main Battery*	NAS Whidbey Island

A-6 Attack Squadrons, US Marine Corps

VMA(AW)-121	*Green Knights*	MCAS Cherry Point
VMA(AW)-224		MCAS Cherry Point
VMA(AW)-225	*Vagabonds*	MCAS El Toro
VMA(AW)-242	*Batmen*	MCAS El Toro
VMA(AW)-332	*Polka Dots*	MCAS Cherry Point
VMA(AW)-533	*Hawks*	MCAS Iwakuni
VMAT(AW)-202		MCAS Cherry Point

EA-6A Composite Reconnaissance Squadrons, US Marine Corps

VMCJ-1	MCAS Iwakuni
VMCJ-2	MCAS Cherry Point
VMCJ-3	MCAS El Toro

EA-6B Tactical Electronic Warfare Squadrons, US Navy

VAQ-129	*New Vikings*	NAS Whidbey Island
VAQ-130	*Zappers*	NAS Whidbey Island
VAQ-131		NAS Whidbey Island
VAQ-132	*Scorpions*	NAS Whidbey Island
VAQ-133	*Wizards*	NAS Whidbey Island
VAQ-134		NAS Whidbey Island
VAQ-135		NAS Whidbey Island

Miscellaneous and Deactivated Squadrons

VX-5 *Vampires* Operational Test and Evaluation Force
VAH-123 Flew A-6As prior to formation of VA-128 and is now deactivated.

US Marine Corps Unit Code Letters

VMA(AW)-121	VK	VMAT(AW)-202	KC
VMA(AW)-224	WK	VMCJ-1	RM
VMA(AW)-225	CE	VMCJ-2	CY
VMA(AW)-242	DT	VMCJ-3	TN
VMA(AW)-332	EA		
VMA(AW)-533	ED		

TABLE IV: LIST OF COMMON ABBREVIATIONS

AN/	US Air Force—US Navy joint inventory classification
BIS	Board of Inspection and Survey
B/N	Bombadier/Navigator
BuNo.	Navy Bureau of Aeronautics assigned serial number
ECM	Electronic Countermeasures
FLIR	Forward Looking Infra-Red system
FY	Fiscal Year
LLL-TV	Low Light Level Television system
MCAS	Marine Corps Air Station
NAS	Naval Air Station
NATC	Naval Air Test Center
NPE	Navy Preliminary Evaluation
PAT/ARM	Passive Angle Tracking—Anti-Radiation Missile
TRAM	Target Recognition Attack Multisensor
TRIM	Trails, Roads, Interdiction, Multisensor (Navy)
VA	Attack Squadron (Navy)
VAQ	Tactical Electronic Warfare Squadron (Navy)
VMA(AW)	Attack Squadron (All-Weather) (Marine Corps)
VMAT(AW)	Attack Training Squadron (All-Weather) (Marine Corps)
VMCJ	Composite Reconnaissance Squadron (Marine Corps)

Series Editor: CHARLES W. CAIN